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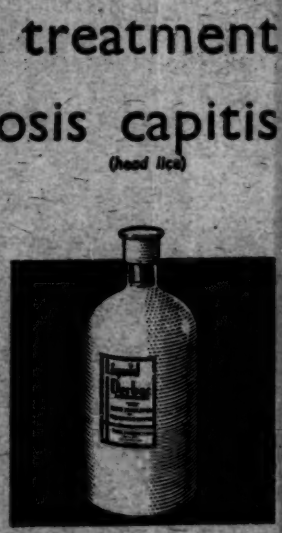

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BRITISH MEDICAL JOURNAL

LONDON SATURDAY FEBRUARY 11 1950

THE ROLE OF THE AGED IN MODERN SOCIETY*

BY

J. H. SHELDON, M.D., F.R.C.P.

The Royal Hospital, Wolverhampton

My first duty is to express my sincere appreciation of the honour of the invitation to deliver the first F. E. Williams Lecture, which was founded by the late Mr. F. E. Williams, of Sussex, with the object of promoting the study of old age and the prevention and relief of its sufferings and infirmities. As this is the first lecture, I have thought it best to take as wide a regard of the subject as possible, in an endeavour to bring into one focus all those aspects of old age which at the moment are of interest to so many different kinds of people; and I would add that I have chosen the title "The Role of the Aged" in order to emphasize from the outset the positive contributions which old people both can and do make to society, for which they rarely receive the credit they deserve.

Two Postulates

We can start from two postulates. The first, which is a matter of fact, is that the numbers of the old, both absolute and relative to the rest of the population, are slowly but steadily increasing. Whereas at the present time there are approximately five million people in Great Britain over the age of 65 to thirty-one million people of working age (15 to 65), in 25 years' time there may well be something like eight and a half million old people to some twenty-nine million other adults. The proportion of old people to those of working age may therefore rise from one to six to one to four or even to one to three if the mortality rates for the old show much improvement in that period. The river is therefore rising, though it is not yet in full spate, and before flood levels are reached it is only prudent to examine its banks.

This leads to the second postulate—which is a matter of opinion—that in at any rate one respect the banks are already showing signs of strain; it is probable that from the domestic point of view the community is already bearing about as big a burden of old age as it can manage. The reasons for this opinion are as follows. It must never be forgotten that old age is fundamentally a domestic problem. In 1946 the number of persons of pensionable age who were housed in public assistance institutions amounted to no more than a mere 1.16% of the total, leaving 99% outside. In the Wolverhampton Survey of 1945–7 (Sheldon, 1948) only 2% were in institutions or special homes, 98% living in private houses. Since then, numerous homes for the aged have been opened, both by local authorities and by private bodies, but the total numbers affected are relatively small, and I should be surprised if old people living in private houses number much less than 97% of the total. Old people cannot live as an integral part of the domestic community without at times causing strain on those who look after them, and in Wolverhampton no less than 7.7% of the old people were found to be imposing strains of the severest character, robbing those who carried them of any chance of a normal life. This figure represents a number that is not only large but is at least twice and perhaps three times as big as those already cared for in institutions and special homes. Since it would be quite impossible to enlarge the existing accommodation to that extent, this state of affairs will have to continue, and even if the percentage remains the same the strain imposed on society is bound to increase with the growth in total numbers of the old.

Another aspect of this domestic problem may be seen from the fact that approximately 10% of old people are confined to their houses by reason of physical or mental decrepitude, and it is a sobering thought that one in ten old people requires the constant domestic care such cases demand. In the light of these facts it is difficult to avoid the conclusion that the community is already saturated with the domestic care of old people, but we can obtain some confirmation from an entirely different point of view. It would be quite unlike the previous emotional history of these islands for us ever to be found getting worked up about some problem which might only be going to fall on us in the future, and the mere extent of the interest now being taken in old age is an indication of the general realization that the problem is fairly and squarely on us now.

What Can be Done?

Essentially we have a few years in which to acquire the information necessary for an adequate study of the problem before decisions involving matters of high policy have to be taken. There is, however, no doubt that the overriding decision must be that the burden of old age to be anticipated in the future can never be dealt with by the purely caretaker policy of providing sufficient homes and institutions—the burden will remain a domestic one. Not only is there no possibility of providing the services and buildings required, but it must be remembered that old age is no solvent of obstinacy, and having got the beds it would be an entirely different problem to persuade most of the old people to make use of them. Within these limits there are, however, three broad objectives which require attack. (1) We must endeavour to preserve the independence of old people for as long as possible, so as to stave off the day when they become a burden on others. (2) We must do everything possible to assist the family in the care of its aged dependants, without at the same time relieving it of

*The first F. E. Williams Lecture, delivered to the Royal College of Physicians of London on July 12, 1949.

the necessity for still taking an interest in the matter. (3) We must ensure that all those old people who are willing to contribute to the total national effort are enabled to do so.

1. Preservation of Independence

There are two general aspects of the process of ageing that must be borne in mind in considering the physical independence of old people. First there is a considerable gap between the official and the natural onset of old age. The official age may be taken as that at which contributory pensions first become payable—that is, 60 for women and 65 for men. The natural age may be taken as that at which the physical independence of adult life becomes so compromised that there is a definite limitation of activity. The time of onset varies greatly from individual to individual, but the information available for old people living a natural life at home gives a clear answer, taking them as a whole. (1) The proportion who are fully ambulant sharply declines after 70; (2) the proportion who are confined to the house increases steadily after 70; (3) the number capable of carrying heavy domestic strains, such as the rearing of grandchildren, declines after 70, though the potential incidence of such strains increases with age; (4) 50% of women are engaged in the sole domestic care of their household up to the age of 70. At 75, 40% are so engaged, and thereafter the numbers fall rapidly to 18% at 80, and only 4% at 85. Natural old age therefore makes itself felt in most people at about 70, and by 75 the process has acquired such momentum that only the exceptional individual escapes. There is therefore a period of five to ten years between the official and the natural onset of old age, and in the future it will be of the utmost importance that old people during this period should play an active part in life.

Secondly, it is well known that women outnumber men at advanced ages, and it would be expected that the lower mortality of old women would be accompanied by a lower morbidity rate, but this is not the case. Fig. 1 shows the percentage of old people who were actually receiving medical treatment at the time of the Wolverhampton survey, and the difference between old men and old women becomes increasingly marked after 70. Although old men tend on the whole to maintain a better physique than old women, their hold on life is nevertheless brittle, whereas, in spite of an increasing decrepitude with the years, old women have a power of sheer survival denied to the men. The practical importance of this is that, in any plans for the physical care of the really aged, women will be concerned much more than men.

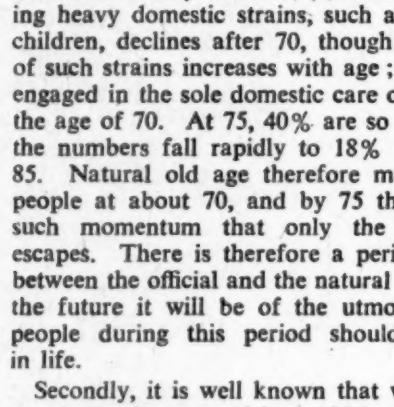

FIG. 1.—Percentage of old-age population receiving medical treatment.

Where can we come to grips with this problem of preserving the physical independence of old people? A consideration of their powers of movement gives us a clue. Taking all ages together, 66% of those beyond 65 are fully ambulant and do not need help; 10% are confined to the house and for the most part are beyond help. There remains a large intermediate group, comprising 22.5% of all old people, who have limited powers of outside movement; for the most part these are looking after themselves at home, and some even manage to continue at work. They are all doing their best to preserve their independence on a diminishing margin of physical strength, so that in many cases both husband and wife have to combine to get through the ordinary domestic task of running the household. These people are already on the downward path from the fully ambulant class to those restricted to the house and under the care of others, so that it is of the utmost importance that everything possible should be done to assist them. The common symptoms responsible for their limitation of movement are arthritis, dyspnoea, senile weakness, painful feet, vertigo, stress incontinence in women, and the effects of previous strokes. The only one of these on which I wish to make any clinical statement is pain in the feet, the incidence of which is shown in Fig. 2 and reveals a marked difference between men and women. The rising incidence with age in men is probably associated with the fact that men at these ages tend to take a larger size in shoes, owing to an intolerance of a close fit, which in turn is probably caused by a spreading of the foot due to senile stretching of the ligaments. There is nothing to be done about this, but the position with women is very different. As is well known, they suffer extensively from the various orthopaedic deformities of the foot, and the incidence remains more or less steady at nearly 50%. Such painful feet are of the greatest practical importance, because the general health is in no way affected and there are many potentially vigorous women in the community whose usefulness is limited by this state of affairs. Not only is there good reason for providing what easement chiropody can give, but the prevention of this shocking state of affairs in the future will be an essential part of an old-age service in order to avoid such needless waste of potential effort.

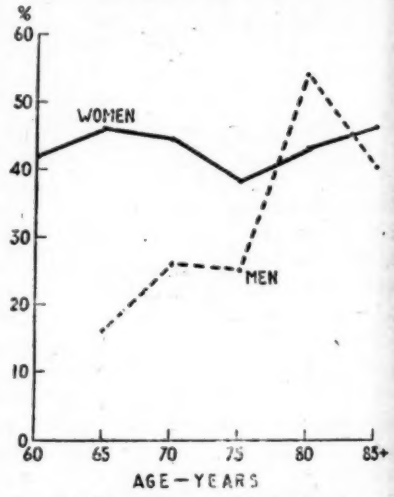

FIG. 2.—Percentage of pain in feet in old age.

This is not the place to discuss the therapeutics of the conditions mentioned above, but it is clear from the work of such pioneers as Cosin (1947), Howell (1948), and Dr. Marjorie Warren (1948) that, although not capable of cure, much can be done to help old people suffering from some of them. The treatments concerned come largely under the heads of physiotherapy and rehabilitation, which are essentially hospital activities, and some means will have to be found of making them available when necessary to the million or more individuals who comprise the group under discussion. Since it is neither possible nor desirable to do this by means of a stay in hospital, the present gap between hospital and home care has to be bridged; it is here that the pioneer schemes associated with the names of Dr. Bluestone (1949), in America, and of Dr. Brooke (1948), of Carshalton, in this

country, are of such profound significance for the future. The essential feature is that there is a special old-age service, co-ordinated by a committee on which all the various administrative and other interests concerned are represented.

On the medical side the service centres round the hospital physician and his social workers, and in place of a mere routine admission to a bed the patient is visited at home and an assessment made of the individual's medical and social needs. Where this includes hospital treatment every endeavour is made to provide the individual with it as an out-patient, transport being arranged for all who are unable to avail themselves of public means of conveyance: this is essential, for many old people are extremely shy of participating in modern traffic.

Admission to a hospital bed is confined to a few sharply limited categories, the aim being to provide the patient with all hospital facilities short of admission or to admit on a short-stay basis, giving priority to urgency of need. Social services are also provided when possible; this is fundamental, for in old people it is impossible to separate health from disease, and in so many cases if they are to keep going some easement of their domestic load is as necessary as medical treatment. I am in complete agreement with Dr. Brooke that for many old people a laundry service is essential. The weekly wash imposes the severest physical strain of all domestic activity, and when this is exaggerated by the washing of heavy bed-linen, as happens so often when an old woman is nursing a failing husband, the burden may become impossible. In some cases a meals service would be helpful, and in others the various forms of home help may be necessary. It seems to be clear that these services cost the community less than the full care of the old person in a hospital bed, and the scheme merits the utmost experimentation. There is, however, one proviso—it must never be so lavish that it relieves the family of any need for a sense of responsibility for the care of their aged relations. This leads at once to the second objective, the assistance of the family and the preservation of the family spirit.

2. The Family

Certain facts in the social biology of normal old age are important. In the first place, old people in general treasure their independence, and surrender it only when obliged to do so. They are therefore worth helping. Taking all ages together, 62% of their normal domestic care is done by themselves and 90% is done within the family. Only 10% is attributable to paid help—such as housekeepers and institutional care. Secondly, in spite of their independent spirit, the majority of old people form part of a human group which is loose in times of ease and tightly knit in times of stress. When old people are ill in bed at home, some 75% of the nursing is done by the family and 25% by neighbours. A somewhat similar state of affairs was found by Thomson and Curran (1948) in Glasgow, where some 75% of the aftercare at home of patients discharged from hospital was provided by a mixture of relations and friends. Since the neighbour does not usually live in the same house as the old person, nor in many cases do the younger relations, it may well be of importance that they should be living as close as possible. The findings in the Wolverhampton survey demonstrate this quite clearly, for 4% of old people had children actually living next door, 10% had children living in the same street, and 20% had children living within half a mile. It is probable that this contiguity may be of deep importance, as an indication of a mutual way of life that both generations consider ideal.

It is said that there is nowadays a steady decline in the strength of family ties and the general sense of family responsibility; whether that be true or not, it is at any rate clear that there is plenty left. This statement receives abundant confirmation from the findings of Thomson and Curran (1948) in Glasgow and of Professor A. P. Thomson (1949) in Birmingham, where it is not till after four years that the number of inmates in a public institution receiving weekly visits from their relatives falls much below 50%. It is equally clear that there is no hope of carrying the burdens of old age that the future has in store for us without assistance from the family and neighbours at least equal to that given at the present time. It is therefore of the utmost importance that we should have a far deeper understanding than we now possess, not only of the nature and origin of the sense of family responsibility, but also of those external factors which either facilitate or hinder its operation. Yet we really know little, and I ask three questions which seem to me to reveal our ignorance of these matters.

The Good Neighbour

1. Neighbours contribute 25% of the nursing of old people at home in a midland industrial town, and this contribution is of such practical importance that we could not afford to be deprived of it. Yet when we ask what is the anatomy of good neighbouring we are reduced to speculation. It certainly depends in part on contiguity of housing and length of acquaintance, which is probably why, as all practitioners in this town agree, it is not so good in the new housing estates as in the old-fashioned streets of continuous houses. Yet it is certainly not an inevitable product of suitable physical conditions, and is in fact a difficult social art which has to combine a readiness to help without an undue curiosity about what is going on next door. We need information which only the general practitioner and the district nurse can provide, and which we are without at the present time.

The Family Spirit

2. It is well known that the domestic care of some old people throws at times a tremendous strain on others. In Wolverhampton 57% of this strain is carried by the daughter, which may be taken as a compliment to the strength of family spirit until we ask, "In how many cases is this burden spread equally over all the daughters; and in how many cases do some of the daughters compound for their sense of responsibility by casting the whole burden on the shoulders of one sister—usually the youngest—while of course retaining their full rights of criticism, especially at the end?" That both types of family exist is a commonplace of experience, but until we know the various antecedents which produce one or the other we are lacking an essential item in our knowledge of the family.

Factors in Family Responsibility

3. Are there geographical variations within these islands in the sense of family responsibility? Fig. 3 shows a remarkable state of affairs. It sets forth the proportion of old people living alone in Mid-Rhondda, Wolverhampton, York, Oldham, and the two London boroughs of St. Pancras and Wands-

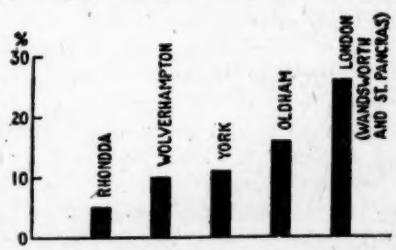

FIG. 3.—Percentage of old-age population living alone.

worth, as revealed by the Rowntree Survey (*Old People*, 1947). It is astonishing that there should be nearly six times as many living alone in London as in South Wales, and since local variations in family spirit, even if they exist at all, cannot be as great as that, it is probable that the figures are expressing other factors as well, and in particular some which condition the natural operation of the sense of family unity. As between London and the Rhondda, the report on the housing conditions by the Rowntree Survey suggests that in the Rhondda few old people are living alone, because of the high proportion of households in which two and in many cases three generations are living together owing to housing difficulties. In London, on the other hand, a far greater proportion of old people than elsewhere are living, not in private houses, but in flats, tenements, and single rooms. Two entirely different types of family strain may therefore be in operation, arising in the one case from undue propinquity and in the other from undue separation.

The difference between Wolverhampton and Oldham is also of interest, for they are both manufacturing towns of the same order of size, and yet there are 16% living alone in Oldham as against 10% in Wolverhampton, while no one would suggest that family spirit in Lancashire was any less than elsewhere. According to the Rowntree report, housing in Oldham was worse than in Wolverhampton, where between the two wars extensive slum clearances were effected, with the erection of new housing estates on the outskirts of the town. The Wolverhampton survey (Sheldon, 1948) indicated that, while 10% of old people were ostensibly living alone, only 5% were in fact doing so, the others having relatives living so close that they formed one family unit. It may well be that the larger proportion of old people living alone in Oldham is counterbalanced by a similarly larger proportion of old people with younger relations close at hand, and that the family takes an even larger share in the care of its aged dependants than in Wolverhampton.

It is at any rate clear that the four localities mentioned display different modalities of family life in relation to old age, and a thorough investigation of the relevant facts would surely yield a fruitful return. The matter is of particular importance in so far as it involves architectural features, for as the proportion of old people increases relatively to those of working age so will their accommodation in the type of housing that both generations mutually consider most suitable become more and more urgent. There is little doubt, on the basis of our present knowledge, that both the older and the younger generations prefer the arrangement whereby each live independently in separate houses sited close to each other.

In the meantime the family requires relief in two ways at the moment. Some of the younger generation are carrying disproportionately heavy burdens in the care of their old people, one of the worst features of which is that there is often no prospect of even temporary relief until the death of the old person. Arrangements for the care of the aged relative to allow the younger generation to get a yearly holiday are urgently needed. The other category of strain that demands relief is the case of the married woman who in addition to her own family has the continuous care of two—and occasionally more—aged relations. Such not only need a yearly break, but domestic assistance as well. Not only is there no danger that either of these measures would impair the sense of family responsibility, but they are probably essential if the family is to carry a heavier burden in the future, and, on the simple ground of equity, these unfortunates who carry such a disproportionate load deserve help from the community.

3. Encouragement of Activity in the Old

The third objective is to ensure that every old person willing to do so is enabled to contribute to the total national effort. Since the solution of this problem lies in the hands of the economists, industrialists, and administrators, only a brief review can be given here, but it is certainly no whit less important than the aspects of old age which have already been dealt with. In brief, as the proportion of old people to those of working age rises from 1 in 6 to 1 in 4 or less, if all the old sit back on their first pensionable birthday and draw a pension with which they compete for consumer goods made by a decreasing section of the population, the standard of life of both generations will inevitably be endangered (Royal Commission on Population, 1949). The problem mainly concerns the man, for we have seen that women continue at their domestic work as long as they are physically capable of doing so, whereas by contrast many men are forced into sudden retirement at an age when they may have ten or more years of active life still in prospect. One may ask if it is right for men to continue working in old age? Apart altogether from its future economic importance, we can, I think, definitely answer that, other things being equal, a busy rather than an aimless life is an ideal prescription for old age, and the proof lies in the well-known sight of the man who retires from a busy occupation to die in a year or two of boredom. The "other things" which justify asking an old man to continue at work are that (1) the physical nature of the occupation must be consistent with the physical powers of a man of years, and (2) he must derive emotional satisfaction from the job.

If, however, one were to assume that—like women—all old men were anxious to disregard their retiring age and keep on at work till physically unable, a host of difficulties would arise, a mere recitation of which is sufficient to indicate their scale and complexity. They all derive from the fact that our civilization is industrial rather than agricultural, for modern industry bears hard in many ways on the employment of old men. In the first place, there is the steady but tragic decline in the need for individual craftsmanship, which is replaced by that of the machine. Craftsmanship is ageless and its execution continues to give satisfaction as long as life lasts, and where it is still necessary there is rarely any difficulty in the employment of men into advanced old age; but the need is a declining one.

A second difficulty is that the nature of the occupation may become unsuited to a man of advancing years. Most employers are agreed that the old man in the factory has certain valuable qualities: he is usually a good timekeeper, his work is reliable, and he has a sense of responsibility towards tools which the younger employees often lack; but speed—a quality often so necessary in modern industry—is usually denied him. Either for this reason or because of the physical nature of the task, the time comes when he can no longer keep up, and the question of alternative employment arises. Light jobs are scarce, are often uneconomic, and for these the old man has to face competition from younger workers suffering from industrial injuries. The provision of alternative jobs that are economically sound is difficult, because we still have insufficient knowledge of the types of work that are really suitable for old age, and also because we do not yet know the extent to which old people are capable of learning them well enough to make it worth while setting up the necessary establishments. Further, many of the industrial firms

are comparatively small, and it might well prove necessary to combine the old workers from several firms in a separate workshop. This in turn would mean the severance of human contacts to which the old person is accustomed, as well as leading to probable difficulties in transport—and faced by all these factors, which in essence add up to learning a new job and starting life all over again, most old men would prefer to pack up and retire on their contributory pension.

A third difficulty arises from the number of men in modern life who exercise power in some degree over their fellows, from foremen up to high administrators. The retirement of these men at a fixed age robs the community of the services of its best men, who may be at the height of their powers, when they have still a long potential contribution in front of them. To retain them indefinitely, however, blocks the ladder of promotion to youth and has its own undesirable results; on the other hand, power being an exercise of the spirit that is usually surrendered with reluctance, it is almost impossible to ask such men to continue at work in a subordinate capacity.

Such are some of the difficulties which would face us if all old men wished to continue at work indefinitely. By no means all, however, have this desire. Some are neutral, and will go on working past their pensionable birthday only if there is sufficient financial inducement, as can be seen from the fact that investigations into the employment of old people show a positive correlation between the number of old men at work and the number with no additional source of income. The metaphor of the carrot and the donkey therefore becomes relevant, but it is a difficult carrot to design, since it must not be so big that it is economically unsound and yet be big enough to provide an incentive. The present scheme whereby when an old man continues at work past 65 he adds one shilling a week to his ultimate pension for every six months of work (up to a certain maximum) is an effort to meet this point; but time alone will show whether it is successful.

Some men, on the other hand, desire to give up work at the earliest possible moment, and they must surely be allowed to do so. Either they dislike their occupation, in which case they are not worth employing, or they are men with a consuming hobby to which they look forward to devoting their remaining years. These are the minor creative spirits of the time, and it would be wrong to confine them to their task past retiring age. Not only do they make definite contributions to the sum total of our civilization, but they possess the best recipe for old age—and in fact they usually live lives which are not only long but also healthy and happy. This very short review shows that the employment of old men presents us with a problem whose solution is as difficult as it is urgent.

Conclusion

To sum up: As the numbers of old people increase, so will it become more and more urgent that they should play as active a part in society as possible. To this end the difficulties that surround the continued employment of old men will need to be surmounted, and it will be necessary to provide a special medical service for old people whose main aim will be to preserve their independence for as long as possible. Such a service will require to bridge the gap between hospital and home and integrate medical care with social aid. As old people gradually become really aged and unable to maintain their own care, so will they have to continue to pass, as they mainly do at present, into the care of the family. If the family, however, is to sustain the burdens facing it in the future, assistance from the community will undoubtedly be necessary. For this to achieve its object without destroying the sense of family responsibility much more knowledge of the many social factors involved is required than we at present possess. Unless we can make some sort of a solution of these problems, then the future has indeed a millstone it is ready to place round our necks.

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THE CARE OF THE CHRONIC SICK—III*

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Of the many complex administrative issues which arise in apparent consequence of recent health legislation, none is more challenging than the care of the chronic sick. In fact, the problem is neither new nor more urgent than it has been for many years under the administration of the Poor Law or local authorities, but it is more conspicuous because the new authorities which have taken over the hospitals have terms of reference very different from the old. Act of Parliament sharply limits their responsibility to hospital care. Faced with the unpleasant facts of long waiting-lists and insufficient beds, they cannot view with composure the possibility that their hospitals now contain many patients whose medical needs are occasional or transient but whose social circumstances determine their admission or prohibit their discharge.

The apparent intention of the National Health Service Act (Sections 25, 28, and 29) and of the National Assistance Act (Sections 21, 25, and 29) is to leave to local authorities the domiciliary and institutional care of persons who need not be admitted to hospitals. Much hangs on the interpretation of medical requirements which normally necessitate hospital admission, but in this matter the past history of the chronic sick is not instructive. The general practitioner who stated to the relieving officer that in his opinion a patient should be admitted to hospital was inevitably influenced by the inadequacy of facilities at home as well as by the urgency of the need for institutional treatment. It may therefore be objected that data derived from investigation of the present hospital population, though indicative of the shortcomings of past services, are unacceptable as a guide to future policy. None the less, a good deal can be learned from consideration of the patients now in hospital, and we suggest three questions which focus attention on the main issues.

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1. How many hospital beds are occupied by the chronic sick?
2. On the basis of their medical and nursing requirements how should responsibility for these patients be divided between regional hospital boards and local authorities under the provisions of the National Health Service and National Assistance Acts?
3. To what extent will improved services in the acute and recovery phases of illness reduce the numbers of patients requiring prolonged medical or nursing attention?

On the first two of these questions we have already reported in full the results of investigations to which we here refer briefly (Lowe and McKeown, 1949, 1950). An answer to the third question is no less important, but although some suggestive data are examined below it is not possible at this time to measure the effect of improved services or to give precise figures for the accommodation which would meet the responsibilities of local authorities and regional hospital boards.

In what follows we refer mainly to material collected in a survey of patients in the largest hospital for the chronic sick in Birmingham. Western Road Infirmary contained 1,005 patients who were investigated by social workers and doctors in the period October, 1948, to March, 1949. The data and the conclusions based on them will be discussed more fully in the appropriate sections.

Hospital Beds Occupied by the Chronic Sick: Age Specific Rates

The number of patients in hospitals for the chronic sick in England and Wales was given as 70,000 by the report of the Ministry of Health for the year ended March 31, 1947. The hospital surveys completed during the war years gave regional estimates of future bed requirements (Ministry of Health, 1945–6), which varied between 1.25 (London) and 2.5 (South-western Region) per 1,000 of the population. In some cases these figures have been adjusted to allow for possible age changes, but since the methods of calculation are not uniform they can be accepted only as rough assessments of regional requirements. It was on the strength of these estimates that the chronic sick were stated to require between 2 and 2.5 beds per 1,000 of the general population.

The striking differences in bed requirements draw attention to the unsatisfactory nature of rates expressed per 1,000 of the population at all ages. In the two hospitals which accommodate the chronic sick in Birmingham, 81% of patients were 65 and over, and the few data available from other sources (Ministry of Health, 1945; Affleck, 1947; Greenwood, 1949) suggest that the high proportion is not peculiar to this city. We therefore need age specific rates which can be applied with regard for regional differences and secular changes in the age composition of the population. The data given for Birmingham in Table I (see also Fig. 1) show that of persons 65 and over approximately 12 per 1,000 are in one of the two city hospitals which care for the chronic sick.

Disposal of Chronic Sick now in Hospital

Agreement about disposal of hospital patients presupposes an assessment of their medical, nursing, and domestic requirements, and an acceptance of certain defined needs as reasonable criteria for hospital admission

TABLE I.—*Patients in Birmingham Hospitals for the Chronic Sick: Age Specific Rates (see also Fig. 1)*

Age Groups (Years):	0–14	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and Over	All Ages	65 and Over
Civilian population* ..	252,229	128,786	183,979	175,671	140,095	105,419	70,420	25,939	3,462	1,086,000	99,821
Patients in hospital† ..	—	3	14	36	72	161	449	576	204	1,515	1,229
Rates per 1,000 population ..	0	0·02	0·08	0·20	0·51	1·53	6·38	22·21	58·93	1·40	12·31

* Registrar-General's estimates for December 31, 1947. † Birmingham hospitals, December 31, 1948.

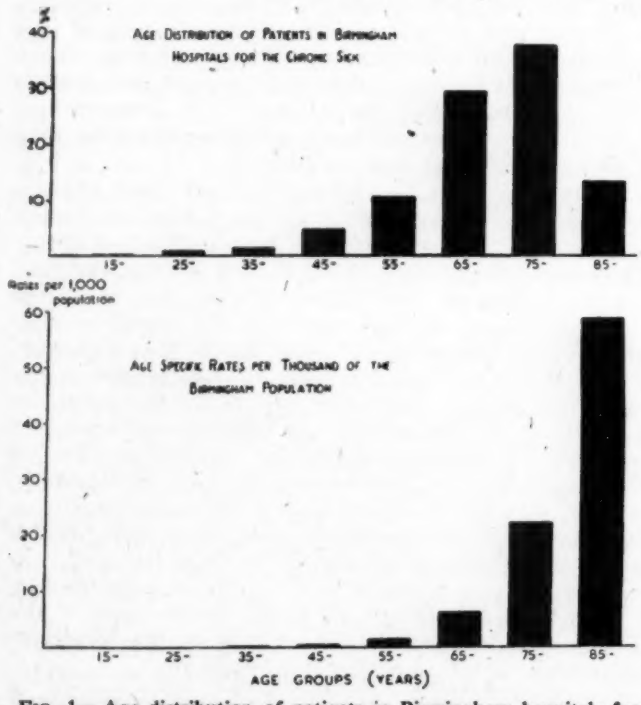

FIG. 1.—Age distribution of patients in Birmingham hospitals for the chronic sick and the age specific rates per 1,000 of the Birmingham population (See Table I).

TABLE II.—*Medical Attention and Skilled Nursing Required by Patients in Western Road Infirmary**

	Daily	More than Once a Week	Weekly	Fortnightly	Monthly or Less	None	Total
Medical attention	1·6% (16)	5·8% (58)	10·2% (103)	8·5% (85)	70·9% (713)	3·0% (30)	100% (1,005)
Skilled nursing ..	11·9% (120)	3·8% (38)	0·3% (3)	0·3% (3)	—	83·7% (841)	100% (1,005)

* All subsequent tables are based on the investigation of 1,005 patients in Western Road Infirmary.
Figures in parentheses represent actual number of cases.

The nature and frequency of attention required by all patients at Western Road Infirmary were therefore assessed in relation to four types of service, with the following results: (*a*) medical attention (7% more often than once a week, Table II); (*b*) skilled nursing* (16%. Table II): simple nursing† (93%); and domestic service (all patients)

On the basis of the attention required the disposal of each patient was next considered in relation to one of the following possibilities.

(*a*) Hospital. Patients needing skilled nursing and/or medical attention once a week or more frequently.

(*b*) Institution (other than hospital) or own home. Patients not requiring skilled nursing or weekly medical attention.

*Skilled nursing: injections, dressings, administration of dangerous drugs, care of acutely ill people, etc.
†Simple nursing: washing, dressing, lifting, feeding, etc.

(*c*) Mental Institution. Patients who, irrespective of other medical or nursing requirements, need personal supervision because of their abnormal mental state.

Table III (see also Fig. 2) shows that roughly one-fifth, three-fifths, and one-fifth of the population at Western Road Infirmary were placed in (*a*), (*b*), and (*c*) respectively.

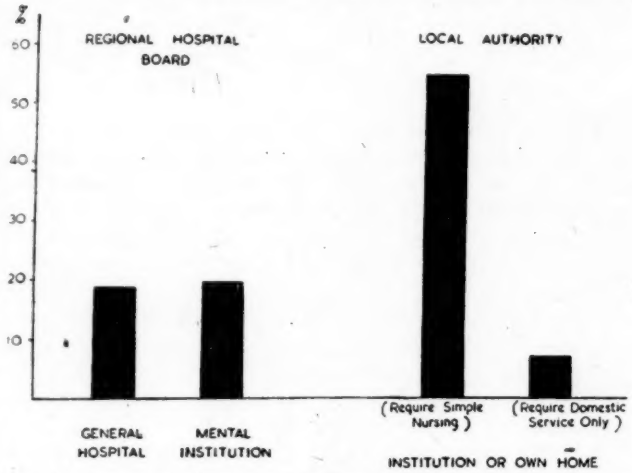

FIG. 2.—Suggested disposal of patients in Western Road Infirmary (See Table III).

TABLE III.—*Suggested Disposal of Patients (see also Fig. 2)*

Patients Without Gross Mental Change			Patients With Gross Mental Change	Total
	(*b*) Institution or Own Home			
(*a*) Hospital*	With Simple Nursing	Without Simple Nursing	(*c*) Mental Institution†	
18·8% (189)	54·6% (549)	7·0% (70)	19·6% (197)	100% (1,005)

* Includes all patients requiring skilled nursing and/or medical attention weekly or more often.
† Includes all patients requiring supervision because of their abnormal mental state.

The table also distinguishes under (*b*) between those who need simple nursing (over one-half) and those who do not (less than one-tenth). For a fuller discussion of this classification we refer the reader to the earlier paper (Lowe and McKeown, 1949).

Adequacy of Medical Services Received by the Chronic Sick

We have so far been concerned with patients now in hospital, and with their possible disposal against the background of the administrative changes introduced by the 1946 National Health Service Act. More important in relation to future plans are patients for whom admission to hospital is now sought, whose medical condition and social circumstances are more representative of the contemporary problem. Until information of this kind is available to correct estimates based on the present population in hospital, we may usefully consider evidence of the incompleteness of earlier services. In this matter we are concerned not so much to expose past deficiencies, of which most people are by now aware, as to give reasons for believing that satisfactory services in the acute and recovery phases of illness will make a considerable contribution to the reduction of the dimensions of the problem.

Admission through general hospitals has of course been valued as a guarantee of adequate investigation before an illness is accepted as chronic. Three-quarters of the patients in Western Road Infirmary had been admitted from their homes; 14% from the wards of general hospitals; and 5% from the out-patient departments of general hospitals (Table IV). Approximately two-thirds of all patients had not had laboratory or out-patient investigations before their admission.

TABLE IV.—*Source of Patients in Western Road Infirmary (i.e., whence admitted)*

General Hospital		Other Hospitals or Nursing Homes	Direct from Home	Unknown	Total
In-patient	Out-patient				
14·0% (141)	5·1% (51)	3·0% (30)	75·7% (761)	2·2% (22)	100% (1,005)

We attempted also to assess the adequacy of treatment received by each patient. It is often impossible to do this after an interval of years, and we therefore confine comment to three problems which more than any others determine the strain on hospital resources. These problems are continence, mobility, and mental state.

Continence

Table V records the proportion of patients incontinent of urine (8%), of faeces (1%), and of both urine and faeces (26%); the proportion incontinent is considerably higher for women than for men. Once again it is often not possible to pass a reliable judgment on the cause, but we can at least identify those illnesses in which incontinence is a usual and sometimes an inevitable complication. Table VI gives information about 137 patients for whom, in the absence of any more reliable guide, we have accepted the diagnosis as the explanation of the incontinence. The most common diagnosis was cerebral thrombosis with hemiplegia, but the difficulty in accepting this without question as a sufficient reason for incontinence is underlined by the fact that 77 other cases of the same type were continent.

TABLE V.—*Incidence of Incontinence*

	Continent	Incontinent			Total
		Urine Only	Faeces Only	Urine and Faeces	
Males	73·6% (327)	5·2% (23)	2·7% (12)	18·5% (82)	100% (444)*
Females ..	58·5% (321)	9·4% (52)	— —	32·1% (176)	100% (549)†
All patients ..	65·2% (648)	7·6% (75)	1·2% (12)	26·0% (258)	100% (993)

* 11 males excluded: 4 colostomy for carcinoma and 7 suprapubic cystotomies.
† 1 female excluded: colostomy for carcinoma.

TABLE VI.—*Cases in Which the Diagnosis is Accepted as an Explanation of the Incontinence (137 patients)*

Diagnosis	Males	Females	Total
1. Cerebral thrombosis with hemiplegia ..	49	57	106
2. Other disease of the central nervous system (disseminated sclerosis, tabes, post-encephalitic dementia, etc.)	11	5	16
3. Carcinoma (cervix, rectum, bladder, etc.)	4	5	9
4. Other diagnoses (prostatic hypertrophy, procidentia, ischio-rectal abscess, etc.)	3	3	6
Total	67	70	137

If we overlook this difficulty and accept the diagnosis as the cause of the incontinence of 137 patients, a further 208 cases are unexplained. Table VII (see also Fig. 3) shows that the diagnosis could not be regarded as the cause of incontinence for 43% of men and 69% of women. The time of onset was also recorded: about one-quarter of the men and two-fifths of the women who were incontinent had become so since their admission to hospital.

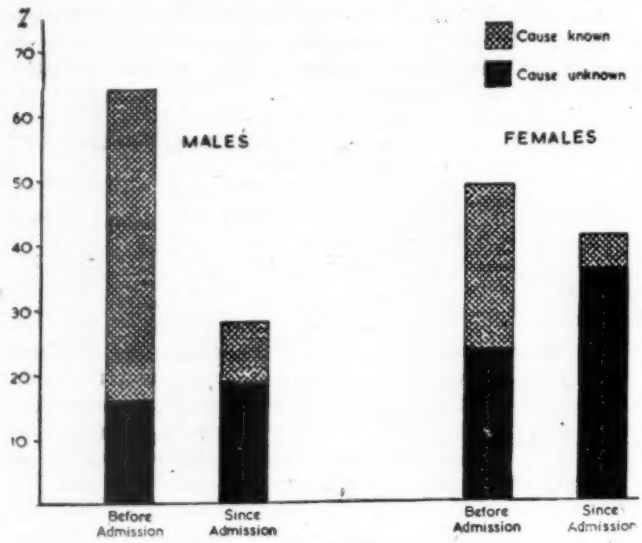

FIG. 3.—Time of onset of incontinence (See Table VII).

TABLE VII.—*Time of Onset of Incontinence (345 patients) (see also Fig. 3)*

	Males				Females			
	Before Admission	Since Admission	Unknown	Total	Before Admission	Since Admission	Unknown	Total
Cause known	47·9% (56)	9·4% (11)	—	57·3% (67)	25·4% (58)	5·3% (12)	—	30·7% (70)
Cause unknown	16·2% (19)	18·8% (22)	7·7% (9)	42·7% (50)	23·7% (54)	36·0% (82)	9·6% (22)	69·3% (158)
Total ..	64·1% (75)	28·2% (33)	7·7% (9)	100% (117)	49·1% (112)	41·3% (94)	9·6% (22)	100% (228)

We are not, of course, entitled to conclude that in the absence of an appropriate diagnosis incontinence was preventable and may fairly be attributed to neglect. Table VIII, which gives information about the mental state

TABLE VIII.—*Mental State of the 208 Patients with Unexplained Incontinence*

	Normal	Abnormal		Unknown	Total
		Need Supervision	Need No Supervision		
Males ..	34·0% (17)	48·0% (24)	10·0% (5)	8·0% (4)	100% (50)
Females ..	31·7% (50)	37·3% (59)	25·9% (41)	5·1% (8)	100% (158)
Total ..	32·2% (67)	39·9% (83)	22·1% (46)	5·8% (12)	100% (208)

of the 208 patients with unexplained incontinence, corrects this impression. It shows that 129 cases were abnormal mentally, 83 to such a degree that they required personal supervision. Even so, we are left with a considerable number of patients, mainly women, for whom neither the physical diagnosis nor the mental state explains the incontinence. It has been reported that some bedfast patients become continent when they are encouraged to get up, and this observation has been confirmed by our colleague, Professor A. P. Thomson (1949).

Mobility

Table IX shows that 58% of patients were bedfast, and that a further 17% could be moved to a chair at the side of the bed. After examining the diagnosis of the 588 bedfast patients we decided not to include it, since it often

TABLE IX.—*Mobility of Patients*

	Bedfast		Sitting Out of Bed		Ambulant			Total
	Lying	Sitting	With Help	Without Help	No Stairs	Stairs	Out of Doors	
Males ..	23·3% (106)	29·7% (135)	9·9% (45)	6·8% (31)	16·3% (74)	1·7% (8)	12·3% (56)	100% (455)
Females	33·3% (183)	29·8% (164)	14·2% (78)	3·1% (17)	14·7% (81)	2·4% (13)	2·5% (14)	100% (550)
Total	28·8% (289)	29·7% (299)	12·2% (123)	4·8% (48)	15·4% (155)	2·1% (21)	7·0% (70)	100% (1,005)

provides no satisfactory explanation of immobility. Doubtfully we have included a judgment on their future mobility (Table X), and according to this estimate 15% could get up with treatment and 3% without it.

TABLE X.—*Estimate of Future Mobility of 588 Bedfast Patients*

	Could Not Get Up	Could Get Up		Future Mobility Doubtful	Total
		With Treatment	Without Treatment		
Males	53·5% (129)	17·9% (43)	3·7% (9)	24·9% (60)	100% (241)
Females	57·6% (200)	12·7% (44)	2·6% (9)	27·1% (94)	100% (347)
Total ..	56·0% (329)	14·8% (87)	3·1% (18)	26·1% (154)	100% (588)

Although in many cases it is quite impossible to give reasons for the immobility of patients who have been confined to bed for a considerable period, experience has shown that with adequate attention in the acute and recovery phases of illness the proportion of patients who remain bedfast can be considerably reduced (Amulree and Sturdee, 1946 ; Warren, 1948 ; Cosin, 1948 ; Howell, 1948 ; Greenwood, 1949).

Mental State

In this inquiry the mental state was considered only in its relation to the supervision required. About one-third of all patients were judged to be abnormal mentally, but only one-fifth to a degree necessitating constant personal supervision (Table XI). We have given elsewhere detailed

TABLE XI.—*Mental State of Patients*

	Normal	Abnormal		Unknown	Total
		Need Supervision	Need No Supervision		
Males ..	68·1% (310)	19·4% (88)	10·1% (46)	2·4% (11)	100% (455)
Females	60·5% (333)	19·8% (109)	17·3% (95)	2·4% (13)	100% (550)
Total	64·0% (643)	19·6% (197)	14·0% (141)	2·4% (24)	100% (1,005)

information about patients who need to be supervised (Lowe and McKeown, 1949); what concerns us here is that there is little in the data to suggest that the number of patients in this category will be reduced by improved services.

Discussion

To avoid misunderstanding we must state explicitly the conclusions which we consider may legitimately be drawn from the data at our disposal. First, and notwithstanding the achievements of the handful of enthusiasts who have interested themselves to good purpose in selected cases, it is only realistic to recognize that there can be little hope of freeing large numbers of hospital beds by disposing of the patients who now occupy them. There are several

reasons for this view, apart from the lack of alternative facilities, and they may be summarized in the statement that some patients have no home, many have no wish to leave, and all in greater or less degree show the mark of the inadequate resources to which they have had access. These facts do not reflect on the hospitals themselves, for too many patients, too few staff, and hopelessly inadequate facilities were not problems which could be solved at the level of the individual hospital. For these reasons we must plan chiefly for future admissions.

Without attempting to give precise figures, we may safely conclude that a considerable proportion of patients of the type now cared for in hospital could in future be accommodated elsewhere if the necessary services were available, and it is evidently the intention of recent Acts of Parliament that this shall be the responsibility of local authorities. To what extent it can be met by complementary home services cannot be known without an examination of the circumstances of patients waiting for admission to hospital, followed by a period of experience in the organization and accountancy of such services. It is at least fairly certain that for some time to come institutions will be needed which add simple nursing and occasional medical attention to the usual resources of the municipal home for the aged.

If relieved in this way of all cases which need never enter hospital, and if permitted to discharge their patients at the earliest moment after completion of treatment, regional hospital boards can re-examine more realistically the proposal that they should in time care for the chronic sick in wards of general hospitals. Alarming as this suggestion is if 2–2.5 beds are needed for every thousand of the population—that is, about one-third of the beds in general hospitals—the situation is quite different if, as our investigation suggests, not more than one-tenth of the total accommodation would suffice. (Separate arrangements would of course be needed for the considerable number of patients who require supervision because of their abnormal mental state.) The advantages to the elderly patient of being received in the acute ward, where modern resources in treatment are available, have always been obvious; the advantages to hospital authorities in easing the most thorny of their staffing problems are hardly less important.

Summary

In Birmingham approximately twelve persons in every thousand aged 65 and over are in hospitals for the chronic sick.

On the assumptions that only patients in need of frequent medical attention or skilled nursing should be in general hospitals, and that patients in need of supervision because of their mental state should be in some form of mental institution, disposal indicated by current requirements of 1,005 patients in Western Road Infirmary, a hospital for the chronic sick, is as follows:—Under regional hospital boards: (*a*) one-fifth in general hospitals, (*b*) one-fifth in some form of mental institution; under local authorities: (*c*) three-fifths divided between (i) their own homes, and (ii) other institutions offering domestic services, simple nursing, and occasional medical attention.

The adequacy of the services received by patients in Western Road Infirmary was assessed in relation to the question of admission, investigation, continence, mobility, and mental state: (*a*) three-quarters of the patients were admitted direct from their homes, and two-thirds had not been investigated before admission; (*b*) about one-third of the patients were incontinent—in many cases the incontinence was not explained by the diagnosis or the mental state of the patient; (*c*) 58% of patients were bedfast, and a further 17% could be moved to a chair at the side of the bed; (*d*) about one-third of all patients were abnormal mentally, but only about one-fifth to a degree necessitating constant personal supervision.

Improved services will no doubt reduce the number of patients incontinent or immobile, but will be unlikely to alter substantially the proportion requiring supervision because of their mental state.

We have pleasure in acknowledging our indebtedness to Professor A. P. Thomson, who has contributed to this survey in many ways. The medical records were completed by Dr. Charmian Elkes, Dr. S. E. Hallissy, and Dr. P. M. Meynell, and the social records by Mrs. L. Leaver and Mrs. H. Pringle. The inquiry owes much to their work and to the generous co-operation of Dr. L. Nagley and his staff at Western Road Infirmary. We are also indebted to Miss Frew and to those members of the Almoner's Department of the Birmingham United Hospitals who assisted in a preliminary pilot survey. Miss Catherine Wall prepared the diagrams in this paper.

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THE SIMULATION OF HEART DISEASE*

BY

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"The heart is deceitful above all things . . . who can know it?"—Jeremiah xvii. 9

The manifestations of organic heart disease are numerous and widespread. When symptoms are confusing and diagnosis is difficult we must not too readily assume that ankle oedema is necessarily of cardiac origin or purpuric spots embolic, any more than that a precordial pain is necessarily of coronary origin or a systolic murmur the product of endocarditis. Symptoms and signs, including radiological and cardiographic, may each in turn mislead.

Ability in differential diagnosis depends on a sound working knowledge and a familiarity with related possibilities, not merely gained in the seclusion of the hospital ward and academic library but reinforced with advantage by personal endeavour and responsibility won in the hard school of private practice. The course of events, if followed with accuracy even for a short space of time, will often provide a diagnostic clue denied to the isolated observations of a single opportunity. Time, in other words, simplifies the problem while it lasts.

Our subject requires to be defined and discussion limited to certain aspects of differential diagnosis. A simulation being a pretence of what is not, consideration must therefore be restricted to those conditions which mimic or are confused with organic heart disease when, in fact, the heart is healthy. There are many conditions which fulfil these requirements. A dissimulation, according to the dictionary, is a concealment of what is. However tempting it may be to include this aspect of diagnosis—namely, the concealment of organic heart disease by symptoms or signs arising elsewhere, as, for instance, left ventricular failure in the

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course of acute Bright's disease—we must keep closely to our title and avoid confusing two distinct entities. Our subject is therefore restricted to those conditions in which, for one reason or another, organic heart disease is assumed to be present when in reality it is not.

Misinterpretation of Symptoms

Difficulties arise in various ways. Perhaps the commonest error is a misinterpretation of symptoms. Most heart disease is imaginary (Cabot, 1926), and unless close attention is given to the character of the complaint, its development and course, the functional can readily be confused with the organic. Both may intermingle in varying proportions.

In forming a judgment from a history the precise description must be extracted from the sufferer by the doctor himself. The personal interview conveys an understanding which no written words can describe. This is always important, but never more so than in cardiology, where an estimation of the efficiency of the heart is assessed on the patient's account of his capabilities, and where on occasions the diagnosis—for example, angina pectoris—is established by this means alone. The doctor must free his mind of prejudice and preconceived diagnostic notions and set about giving attention to the details of the history of the present illness, which only the sufferer can describe. It is a good rule, occasionally forgotten, to base a differential diagnosis on the patient's leading symptom.

Pain

As an example, we may consider pain as a symptom likely to give rise to confusion. The pain of organic heart disease has certain well-known characteristics which are commonly mimicked by a variety of lesions above and below the diaphragm. It is, for instance, notorious how gall-bladder pathology can lead to incrimination of a healthy heart. Sternal pain, sudden in onset and followed promptly by breathlessness and shock, is too readily assumed to be of a coronary origin. When the attack has occurred some time in the past, even a few weeks previously, the diagnosis may be more difficult on account of the patient's inability to supply important details.

If, for instance, the attack has been preceded for some months by a sense of abdominal distension after meals and is accompanied or followed by a shiver, by pain in the tip of the right shoulder, or by moisture at the base of the right lung, a gall-bladder lesion is more likely than a coronary occlusion. The absence of jaundice does not help in the differential diagnosis, as it is the cystic-duct stone which gives rise to most difficulty in separating these two conditions. Recurrent attacks, similar in pattern, without a sustained fall in blood pressure, without an electrocardiographic sequence, and even without positive cholecystograms, will favour a cause other than coronary, and most commonly a cholesterol stone in the neck of the gall-bladder.

Even after removal of the gall-bladder recurrent precordial pain does *not* exclude a biliary cause. If attacks of sternal pain in these circumstances occur at longish intervals, a hint of jaundice appears sooner or later as a result of oedema of the common duct, in which the surgeon will find inspissated bile, gritty material, or even a stone that may have lain overlooked since the previous exploration. A history misinterpreted as a result of the omission of essential details causes great confusion. To witness the attack of pain is of course more helpful, but mistakes are bound to occur, particularly as both conditions occasionally coexist.

Of the acute conditions causing confusion a perforated peptic ulcer is well known. The suddenness of the attack, the severity of the pain, its midline distribution, and the subsequent development of shock with some degree of upper abdominal rigidity are features common to both conditions. Unnecessary exploration of the abdomen is now less frequent than formerly: in fact, the tendency is perhaps to err in the opposite direction. Duodenal ulceration and coronary disease can coexist, and when acute symptoms arise it can be excessively difficult to separate one from the other: electrocardiograms may establish the latter diagnosis; radiology of the abdomen, by conclusively demonstrating a cap of gas below the dome of each diaphragm, may confirm the former diagnosis.

Massive Pulmonary Embolism

With acute conditions in mind it is necessary to refer briefly to pulmonary embolism, as this condition is commonly mistaken for a coronary thrombosis. It is true that the right side of the heart takes the burden in a massive embolization of the lung, but acute cor pulmonale is a temporary derangement of function, and, if the patient survives, it is satisfactory to have the justification of assuring him that irreversible cardiac damage has not necessarily been sustained.

The distinction between a massive pulmonary embolism and an acute coronary occlusion can often be made immediately at the bedside without instrumental aid. Contrasting clinical features are shown in the accompanying Table, but

Table Showing Contrasting Symptomatology in Massive Pulmonary Embolism (Acute Cor Pulmonale) and Acute Coronary Thrombosis

	Massive Pulmonary Embolism	Acute Coronary Occlusion
Preceding state	Convalescent; commonly confined to bed; often post-operative	Ambulant; active
Onset	Abrupt and maximum	Developing rapidly to climax, often in waves
Character of pain	Oppressive, suffocating, overwhelming, occasionally pleuritic	Crushing, tearing, constrictive, vice-like
Site	Widespread, across front of chest, occasionally lateral	Central, retrosternal, occasionally epigastric
Radiation	Not characteristic: occasionally to shoulders	Upwards to neck and jaws; downwards to arms and hands
Dyspnoea	Sudden, intense, gasping	Generally mild
Attitude	Often orthopnoeic, cyanosed, sweating	Restless, less cyanosis, rolling about
Shock	Immediate	Develops later
Local phlebitis	Often tender calf or palpable vein	None

the suddenness of the attack, the degree of shock, the fall in pressure, the leucocytosis, and the increased sedimentation rate are common to both conditions (Roth, 1948).

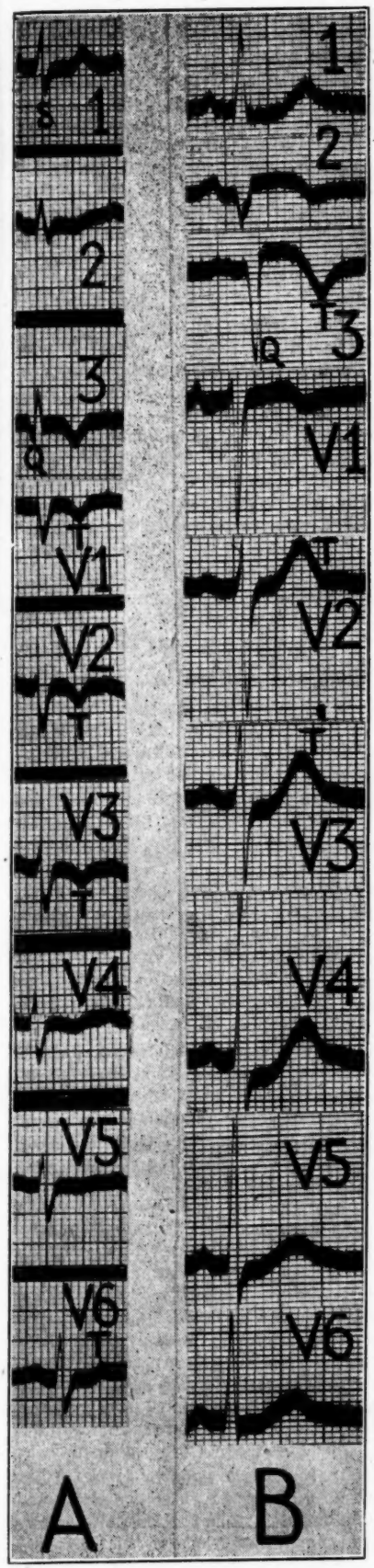
Pulmonary infarction is readily confused with a myocardial infarct involving the posterior and diaphragmatic wall of the heart as is shown in the electrocardiograms These must be interpreted with care. The most striking difference is the transient distortion of pattern associated with the pulmonary infarct and the rapid restoration of more normal curves in the course of two or three days, whereas the changes observed after a myocardial infarct pass through successive stages and may persist for months or years.

Further difficulties arise if pericardial friction is detected After a lung embolism friction over the base of the heart has been attributed by White (1944) to the pressure exerted by the stretched and bulging pulmonary artery against the pericardium underlying the sternum. The detection of pericardial friction over the front of the chest is not a feature of the isolated and uncomplicated posterior myocardial infarct

When it does occur in such circumstances it suggests either an extension of the infarct to involve the anterior wall of the heart or a revision of the diagnosis in the light of the possibility of a major pulmonary infarct. The pericarditis of an anterior myocardial infarct is commonly first detected towards the apex, in contrast to the pericardial friction of the pulmonary embolism, which is occasionally heard over the base of the heart.

My justification for emphasizing the distinction between these two similar conditions is experience of the relief it has been to certain patients to know that they have not sustained the cardiac damage at first suspected.

As the diagnosis of angina of effort depends primarily on a study of painful experiences, mistakes can readily occur. If the patient can take a brisk walk in cold weather without experiencing pain or distress in the chest, it is most unlikely that he suffers from angina. On the other hand, when discomfort is experienced only in the elbow, a referred pain arising from an arthritis in the left shoulder-joint, irritated by movement of the arm on walking, is a more likely explanation than coronary disease. Discomfort in both hands and in the epigastrium experienced during or after a meal, perhaps aggravated by exertion, is also not so uncommon in the presence of a peptic ulcer of the lower end of the oesophagus—a condition recently discussed by Allison (1948).



Electrocardiograms recorded within a few hours of the onset of a massive pulmonary embolism (A), and a posterior myocardial infarct (B). From above downwards are depicted the three standard limb leads and the serial precordial leads from across the chest, beginning with V1 (taken at fourth right intercostal space close to the sternum) and V6 (fifth space in mid-axillary line). The Q waves and inverted T waves in Lead III are similar features, but the presence of S1 and T inversion in the first three chest leads, overlying the right ventricle, is characteristic of pulmonary infarction and serves to distinguish the two conditions. Furthermore, there is notable depression of the S-T segments of V3, V4, and V5 in the records taken after the myocardial infarct.

Anxiety States

Difficulties also arise as a result of a failure to sift the functional from the organic manifestations of heart disease. Careful attention to the patient's description of his symptoms is most important. The apical pain, the emphasis on fatigue, the obvious nervous instability, the multiplicity of his complaints, his demeanour and obvious apprehension, all go to make a picture in sharp contrast with that which we associate with the more apathetic attitude of the genuine sufferer from organic heart disease. It is, alas, only too true that a large proportion—upwards of 50%—of neurotic cardiac patients are "doctor-made" (Hill and Dewar, 1945; Hill, 1946), dating their disability to injudicious advice or restrictions imposed after an inadequate and unconvincing medical examination.

The situation is complicated further by the fact that the organic and the functional may coexist. The differentiation between those symptoms which are the direct outcome of the organic disease, such as the exertional dyspnoea, and those which are merely the expression of the associated emotional upheaval, such as the periapical, axillary, and even brachial discomfort, requires the utmost skill and judgment on the part of the physician, particularly in relation to treatment. It is necessary to reassure, restrain, and at the same time steer a middle course.

It is also well to recognize that, as pointed out by Weiss (1932), temporary or sustained emotional tension, not unlike physical strain, represents a burden on the cardiovascular system, as a result of which pathological processes may develop or become unmasked. After years of semi-invalidism the cardiac neurotic gets a coronary thrombosis which may well confuse and mislead his doctor. I have been impressed by the frequency with which organic vascular disease, coronary thrombosis in particular, may follow on protracted emotional disturbances in the younger age groups.

Misinterpretation of Physical Signs

Just as a symptom may mislead, so also certain physical signs, notably the heart sounds, are readily misinterpreted. The systolic murmur has long given rise to difficulty. Its importance as a manifestation of organic heart disease has undoubtedly been overemphasized in the past. At all events most men are now on guard when faced with the systolic murmur as a solitary finding and rightly hesitate to incriminate the heart. On the other hand, the significant varieties of gallop or triple rhythm are less easily appreciated by those who continue to concentrate solely on the presence or absence of murmurs and not on the equally important character of the heart sounds. Great help is to be had in making a diagnosis of heart disease by consideration of the nature of the sounds themselves, and particularly with regard to the analysis offered by Evans (1948) of the different types of triple rhythm.

Mediastinal Emphysema.—Mediastinal emphysema, originally described by Hamman (1937), is a curiosity which gives rise to crunching, clicking sounds, synchronous with the heart beat and sometimes loud enough to be heard across the room. The fault is attributable to the tracking of air from a ruptured

lung bulla along the pericardial folds and into the mediastinum. It is an innocent condition unaccompanied by cardiac damage. Similar systolic clicking sounds in the presence of a shallow left-sided pneumothorax have been described by Scadding and Wood (1939). All my five cases were males between 22 and 33 years of age. None had organic heart lesions, although each was suspected to be a victim of serious cardiac disease.

Hypotension.—The clinical features of coronary thrombosis are now so well known, and so much emphasis has been put on the subsequent development of a fall in blood pressure, that the detection of hypotension in an obscure malady, characterized perhaps by exhaustion and bodily weakness, may arouse in the mind of the doctor a suspicion that a "silent" coronary thrombosis may perhaps account for the illness. Influenzal debility, low-grade sepsis, and any protracted infection are much more likely causes for hypotension in such circumstances than a coronary occlusion. This is particularly true if the heart is slow, the voice is strong, and the lung bases are free of moisture. Low blood pressure, with systolic and diastolic readings in proportion, is not a sign of organic heart disease. On the other hand, a low systolic pressure with a relatively high diastolic pressure may well be an indication of left ventricular weakness. In this connexion it is equally justifiable to emphasize that high blood pressure does not necessarily imply organic heart disease.

Oedema.—Ankle or sacral oedema should not necessarily incriminate the heart unless a proportionate degree of dyspnoea is also present. A patient, for instance, may complain of fatigue and exhaustion and show on examination a trace of oedema about the feet and ankles. If he is not also breathless, or rendered breathless by lying flat, the oedema is not directly of cardiac origin and nephritis, varicose veins, phlebitis, and anaemia must be considered. Knight (1940) described a form of soft pitting oedema, extending sometimes from the feet to the thighs, in individuals, commonly women, who have spent a night in a deck-chair in an air-raid shelter. The oedema was attributed in part to temporary pressure on the thighs by the wooden cross-piece of the chair obstructing the venous return and in part to local thrombosis. A similar form of oedema is seen during convalescence from various debilitating illnesses and also in healthy people who have been obliged to adopt a sitting posture for long hours at a time, as in long journeys by car or plane.

Less common and more difficult to understand is that variety of oedema which takes a premenstrual form and which may be confined to the feet and ankles, though the hands and eyelids are occasionally involved (Sweeney, 1934). It is usually associated with salt retention, and is commonly accompanied by fatigue and irritability and occasionally by neurotic symptoms. A genuine cardiac oedema does not display a cyclic rhythm.

In general, it may be said that when the nature of the illness is obscure a single physical sign in the circulatory system seldom justifies in itself a cardiological diagnosis. Heart disease of organic origin almost invariably conforms to well-defined patterns and, with the exception of angina, is accompanied by multiple signs dovetailing to make a distinct entity. When these are absent it is rash to incriminate the heart. Similarly, when cardiac signs which cannot be reconciled with the patient's most prominent symptoms are present, it is unlikely that heart disease is the immediate cause of the presenting illness.

Avoidance of Errors.—As already emphasized, an adequate history of the development and course of the illness is the first essential. Breathlessness on exertion is the almost invariable symptom of a diseased heart. Hesitate therefore to condemn a heart unless this symptom has been experienced on an amount of exertion customarily undertaken without distress. To obtain a measure of its severity it is useful to have the patient compare his present or recent capacity for exercise as restricted by breathlessness with that of a month or a year previously. Thus is determined the rate of decline in efficiency of the heart. Even in angina pectoris exertional dyspnoea is usual, if not in the actual attacks of pain, then on minor amounts of exertion between the acute phases, and even often before the more severe handicap first developed. It is true that other symptoms—palpitation, exhaustion, faintness, or actual syncope—may occur in organic heart disease, but without effort dyspnoea, retrosternal pain, or distinctive physical signs they count for little.

Personality Factors.—Errors will be avoided by taking into account the nervous temperament and emotional outlook of the individual. Almost automatically the doctor comes to assess his patient in broad terms of nervous stability and personality. By so doing it is often possible to gauge with greater accuracy the severity of the organic handicap. Allowance must be made for the patient's reliability as a witness, his tendency to minimize, exaggerate, or unintentionally distort his symptoms. We must therefore be prepared to take into account his emotional make-up, mental balance, and susceptibility to pain and distress when we consider his general physical state, constitution, and body build. By so doing the error of confusing extraneous factors with inherent organic cardiac damage will be more readily avoided.

General Physical State.—The weight of the patient is of great importance. It can be measured and compared with standard tables. Before condemning a heart as unsound it is wiser to explain that a man is too heavy and, in simple phraseology, "overloading the engine" rather than to burden his mind with such a mischievous and spurious diagnosis as a fatty heart. The mechanical handicap of obesity must be assessed before assuming that the heart itself is diseased. In other words, the significance of exertional dyspnoea is all the greater if body weight is less than the standard for sex, age, and height.

Anaemia is a constant source of difficulty. As in the case of obesity, fewer errors will be made when haemoglobin readings are determined and the defect recorded quantitatively. Breathlessness, fatigue, and retrosternal pain on exertion, indistinguishable from angina of coronary disease, are well-recognized symptoms of anaemia, and such signs as malleolar oedema, cardiac enlargement, tachycardia, and murmurs, systolic and occasionally diastolic, can all add to the confusion. Haemoglobin estimations can be made in a couple of minutes, the appropriate treatment ordered, weeks or months of invalidism avoided, and a heart acclaimed as healthy. If the blood is not examined any form of anaemia, including leukaemia, can present as angina of effort and the heart be condemned unjustifiably.

Pyrexia often consorts with anaemia and can give rise to difficulty. It is wise not to condemn the heart as the site of the trouble until other possible causes for pyrexia are excluded. Positive blood cultures are not synonymous with bacterial endocarditis. If there is a doubt regarding the presence of a valvular or congenital flaw, bacterial endocarditis is most unlikely, as it occurs in a heart already damaged.

Organic Signs.—Errors will also be avoided by accepting as conclusive evidence of cardiac damage only well-recognized signs of organic heart disease. Admittedly, the diagnosis of angina pectoris is often perforce made on symptoms without a demonstrable structural flaw, but for the most part heart disease is accompanied by precise signs in the cardiovascular system. An enlarged heart is a diseased heart. Its size can be determined by palpation. The feel of the heart in action, the accurate location of the apex beat, its thrusting character in left ventricular enlargement, the tapping quality of the enlarged right ventricle, thrills and rough systolic murmurs, or a soft diastolic murmur at the fourth left interspace should leave no doubt in the mind of the clinician. Certain irregularities—extrasystoles and sinus arrhythmias—can be discarded as diagnostic trash, but fibrillation, paroxysms of tachycardia, and heart-block point to structural flaws. A gallop rhythm, muffled sounds, friction, and pulsus alternans, recognized by auscultation in the course of the determination of blood pressure, are clues to organic damage not readily dismissed.

Aetiological Factors.—Finally, it is a good principle to hesitate to condemn the heart as the site of a disease process without a well-established aetiological factor appropriate to the age group. Congenital flaws, rheumatic infection, luetic disease,

thyrotoxicosis, hypertension, vitamin deficiencies, and degenerative changes are distinct entities. Imaginary toxaemias from teeth and tonsils and from bowel and appendix can now be less readily accepted, as aetiological standards become more exacting and the pattern and course of organic heart disease are appreciated with greater precision. When a critical survey fails to solve the problem, resort must be made to supplementary methods of investigation. Unfortunately, radiology, basal metabolism, blood chemistry, blood pictures, sedimentation rates, and electrocardiograms are often equivocal when their help is most needed, and the final diagnosis then depends on a review of the whole situation helped by the clearer pattern which becomes apparent with the passage of time.

It is therefore reasonable to conclude with Parkinson (1924) that if we get no history of an illness which can produce heart disease, no characteristic symptoms, no age changes, and no signs of the kind ordinarily found on examination, the likelihood of a primary cardiac cause is remote and we are well on the way to the diagnosis of a healthy heart.

Cardiovascular Borderland

It must be admitted that from time to time hard-and-fast decisions are difficult to reach, particularly when the illness consists of one or more isolated episodes, sometimes interspersed at long and irregular intervals in an otherwise healthy subject.

Syncopal Attacks

Faints and fits of various kinds are the outward manifestations of the close linkage between the heart and the brain—a union reinforced by the autonomic nervous system, whose regulator mechanisms are easily disturbed.

The simple syncopal attack, related almost invariably to the erect posture and precipitated by some disagreeable experience, the syncope of a hypersensitive carotid sinus, reproduced by artificial stimulation of the bifurcation of one or other carotid artery, and syncope resulting from postural hypotension are not primarily of cardiac origin. In each instance the attack develops gradually with a train of symptoms leading to loss of consciousness, and recovery ensues gradually from the moment cerebral blood flow is restored by the correction of the gravitational disturbance. These attacks are unassociated with an acute sense of rotation, which points to a vestibular disturbance.

On the other hand, the syncope of the Stokes–Adams seizure, a genuine cardiac cause of loss of consciousness, is abrupt in its onset and as a rule almost equally abrupt in recovery. A diagnostic point of some consequence is the facial flush which accompanies the restoration of ventricular beating. The total arrest of the circulation, the absent pulse and silent heart during the attack, and the facial flush which heralds recovery are not witnessed in other forms of syncope. Hesitate to concur in a diagnosis of senile epilepsy, hypertensive encephalopathy, or even hysteria in the middle-aged or elderly without attention to these points. Furthermore, the Stokes–Adams seizures are not confined to complete heart-block, as normal rhythm may be present in the intervals between the seizures (Gilchrist, 1934, 1937).

Gowers's Syndrome

The term "heart attack" covers a multitude of sins, some of which are easily unravelled, but one condition worthy of exclusion from the realm of organic heart disease is that described by Gowers (1907) and attributed by Ryle (1934) to a "vaso-medullary storm." The attack lasts for 10 to 30 minutes and is dominated by a sense of impending death, associated with utter powerlessness, minor precordial aches, a trifling degree of breathlessness or choking, with tingling in the hands or feet. Facial pallor, cold perspiration, and the appearances of grave illness suggest superficially a serious situation, but the heart is undisturbed, consciousness is never lost, and recovery is gradual without convulsions and is complete in half an hour or so. It is usually possible to justify an optimistic outlook and exclude any organic cardiac cause.

The Heart in Pregnancy

The borderland between the pathological and the physiological is well illustrated by a study of the heart in pregnancy. Here the gain in body weight, the augmented blood volume, the fistulous network at the placental site, and the demands of the foetus result in an increased volume output of the heart, a greater respiratory ventilation, and an augmented oxygen consumption. A burden is thus imposed on the healthy heart, which reaches a maximum about the thirty-sixth week.

When it is appreciated that in her circulatory functions a healthy pregnant woman at rest behaves similarly to a non-pregnant woman engaged in moderate work (Widlund, 1945) it can be understood how breathlessness on effort may be noted during the later months. Some perfectly healthy women during pregnancy are a trifle orthopnoeic and may develop a few scattered rales towards the lung bases; a few may even show a more complete picture of congestive heart failure, with oedema of the lumbar region (a sign more common with hydramnios) and of the feet and ankles. A systolic apical murmur adds to the difficulties. In these circumstances radiology does not readily exclude mitral disease: in fact, the prominent left auricle common in pregnancy may suggest mitral stenosis when in reality no valvular flaw exists (Hollander and Crawford, 1943).

If conclusive auscultatory signs of valvular disease are consistently lacking, if the oedema by its extent is not supported by a proportionate degree of exertional dyspnoea, if the moisture at the lung bases clears on deeper breathing, and if the venous pressure in the neck veins is not obviously increased, a primary cardiac cause for the apparent congestive failure is unlikely.

Gammeltoft's (1928) suspicion that the circulatory adjustments in a healthy pregnant woman could so mimic heart disease as to cause confusion has been confirmed by personal experience at a cardiac clinic in an obstetric hospital where 37 of 352 consecutive pregnant women with alleged signs of cardiac disease were found some years after their delivery to present no clinical or radiological evidence of organic heart disease (Gilchrist and Haig, 1949), and this despite the fact that 18 had shown while pregnant peripheral oedema with dyspnoea sufficient to justify rest in bed for several weeks at a time. In two women the "congestive failure" had warranted caesarean section with sterilization. On subsequent examination some years later both women were found entirely free of organic heart disease and both were in perfect health.

In these particular circumstances it was probably wise to err on the safe side, but it was even more satisfactory to be able to reassure these women that the circulatory disturbances of pregnancy had been temporary and that organic heart disease did not in fact exist.

Summary

There are many conditions which mimic or are confused with organic heart disease when, in fact, the heart is healthy.

Difficulties in diagnosis commonly arise through a misinterpretation of symptoms, pain being a frequent source of confusion. Close attention to the patient's own account of the details of his difficulties is most important if his heart is to be exonerated.

The distinction of gall-bladder lesions from cardiac damage may be exceedingly difficult, particularly in the first attack. On account of the comfort and reassurance which come from the knowledge that irreversible cardiac damage has not been sustained, if the acute phase of a massive pulmonary embolism is survived it is always worth while to endeavour clearly to distinguish this condition from an acute coronary occlusion, which it can on occasions mimic closely.

Difficulties also arise through the misinterpretation of certain physical signs. Apart from those arising locally in the heart, such as systolic murmurs and extraneous noises, hypotension and oedema can give rise to confusion, particularly when the exact nature of the illness is obscure.

Errors in diagnosis can be lessened by assessing the symptoms with care, checking the body weight against standard tables, estimating the haemoglobin level, considering the personality of the patient, and accepting as evidence of organic cardiac damage only well-recognized and indisputable physical signs.

There is, however, a cardiovascular borderland where physiological adaptations and pathological change overlap. The heart in pregnancy is an example. Without close scrutiny of the heart and careful assessment of the degree of exertional dyspnoea in relation to the degree of peripheral oedema, both of which are common in the later months of pregnancy, the ranks of those women known to suffer from rheumatic heart disease may commonly be increased by at least a fictitious 10% in whom the heart is fundamentally sound. On occasions it may be necessary to wait until after the confinement before a final opinion can be expressed regarding the state of the heart, so closely can the temporary adaptations of pregnancy mimic rheumatic heart disease.

It is a good rule never to condemn a heart without ample and conclusive proof.

I am indebted to my colleague, Dr. I. G. W. Hill, for the set of electrocardiograms recorded after a massive pulmonary infarct.

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A scheme for smallpox treatment is suggested by Johnstone and Fluker in the *Monthly Bulletin of the Ministry of Health and the Public Health Laboratory Service* (1949, **8**, 188). They suggest that in confluent and haemorrhagic cases penicillin, in doses of not less than 0.5 mega unit daily for four days, should be given within 24 to 48 hours of the appearance of the focal eruption. When the vesicles become umbilicated, intramuscular streptomycin should be given in a daily dose of 1 g., and the daily amount of penicillin should, if necessary, be increased to 2–5 mega units. If the case is severe streptomycin should be continued for about a fortnight, or until the lesions have become well dried. The penicillin should be administered until most of the scabs have separated, though there can be no precise rule on this point. This scheme was put into operation by the authors for three cases. The effect on the skin lesions was remarkable, and far less scarring resulted than would have been expected.

PAIN IN THE CHEST WALL SIMULATING HEART DISEASE

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Pain in the chest offers a wide field in differential diagnosis, and is particularly interesting to the clinician because in the majority of cases simple clinical methods are sufficient to establish its origin and nature. In spite of this, mistakes are frequent, and 10% of patients referred to hospital with a diagnosis of angina are found in fact to be suffering from pain arising in the chest wall only, with no evidence whatever of underlying cardiac disease. If the patients sent for electrocardiography on the suspicion of cardiac disease are included this percentage is very much higher. Many of these have been induced to give up their employment or been relegated to a life of invalidism, and in all of them the diagnosis has caused unnecessary anxiety.

The frequency with which such patients are seen in routine out-patient work emphasizes the need for a reorientation towards pain in the chest, and suggests that in clinical teaching pride of place is too often given to angina pectoris in explanation of the pain and too little regard is paid to local structural causes.

When the pain is specifically related to exertion it too frequently breeds in the mind of the patient or his doctor the thought of cardiac disease, particularly in over-anxious individuals and in middle-aged men and women who have some other symptom such as breathlessness to act as a pointer in this direction. In a proportion of such cases organic disease of the cardiovascular system can be excluded by a sufficiently detailed history and a careful examination designed not only to establish the normality of the heart but also to discover some local cause to account for the symptoms.

This paper is based on a follow-up of 50 consecutive cases to which a diagnosis of coronary disease had been wrongfully applied, and in each case the cause of the pain was found to be in the structures of the chest wall. It takes no account of the many cases in which coronary disease is simulated by visceral disease elsewhere or is an expression of an underlying anxiety neurosis.

In almost all the cases the mistake in diagnosis had been due to the readiness with which precordial pain on effort had been accepted as indicating heart disease without realizing the need for the closest questioning on the time relationship between the effort and the pain and the exact nature of the effort involved.

The cases under review were classified as follows: (1) muscle strain affecting the chest wall and attachments of the diaphragm, 16 cases; (2) fibrositis of the chest wall, 20 cases; (3) kyphoscoliosis and osteoarthritis of spine, 14 cases.

Cases of disease of the lung and pleura invading the chest wall were not included, though they are well recognized as an occasional cause of difficulty in diagnosis. No instance of a diaphragmatic hernia causing pain simulating coronary disease occurred in the present series, but such a condition might be borne in mind in assessing a difficult case. The salient points of a few selected cases are given for illustrative purposes.

Muscle Strain

Muscle strain can be of two types, acute and chronic. The acute ones simulate a coronary thrombosis and the more chronic ones angina of effort. Of the cases under review, five were acute and eleven chronic.

The acute ones are related to some specific exertion, usually some heavy lifting or muscle strain in an abnormal position. The pain comes on at the time of the exertion and is sudden in onset. It interferes with breathing and movement and may persist for some days, though the acute stage quickly passes off. It may be associated with palpitation and sweating, or even faintness in a person of nervous temperament, though it is not associated with signs of shock.

On examination there may or may not be local tenderness in painful areas, but the pain can always be reproduced by muscle-stretching against resistance. The simplest test is to get the patient to raise the arms and then press forward against resistance applied to the hands. In some cases it is only turning the trunk, or some sudden and unexpected movement, that will reproduce the pain. Following an acute phase the pain may mimic angina by its relation to effort. These cases respond satisfactorily to rest and support with strapping.

The points of differentiation from coronary thrombosis are the sudden onset at the height of exertion, the absence of shock, the close relation to posture and movement, and the relief obtained from the application of support. Specialized investigation is necessary only in a few doubtful cases in which the general disturbance is out of proportion to the local trauma.

Case 1

A man aged 51 was seen by his doctor in August, 1945, for a severe attack of pain in the praecordium which had come on while cleaning a car. It was associated with difficulty in breathing, was sharp and stabbing in character, and was made worse by movement. It was associated with a dull background of pain which lasted two days. A diagnosis of coronary disease had been made. A detailed history showed that the pain had first come on while bending down in a twisted position to polish the wheel of his car. It had been of postural origin and recurred on further bending. During his time in bed it had been made worse on turning in bed or on some movements of the arm, such as reaching for his tea-tray, etc. Clinical examination two weeks after the accident showed no evidence of cardiovascular disease; there was no local tenderness or anything to suggest intrathoracic disease. The pain could, however, be reproduced if the patient adopted the pose of the Discobolus—the attitude in which it had first occurred. A diagnosis of chest-wall pain was therefore made and he was allowed to return to work. Inquiry in 1949 showed that he had had no further trouble. The important points in the differential diagnosis were that the pain was of a sharp stabbing quality at first, that it came on while the patient was bending, and that it could be reproduced by specific movements, particularly by the movement which originated the pain.

Such cases do not require further specialized forms of investigation unless the shadow of heart disease has already been cast on the patient, and indeed they may do harm in the nervous subject.

Case 2

A man aged 40 was seen in 1945. While lifting a motor-car bonnet he felt an excruciating pain in the lower part of the chest. He was unable to breathe except in short gasps, and as he was alone he sat on the running-board of his car for ten minutes before being able to move. He then shuffled his way for 50 yards (46 metres) to his house and was subsequently sent to hospital as a case of coronary thrombosis. When he was seen at hospital the pain had abated somewhat, but he still preferred a crouching position. The pain was localized to the neighbourhood of the xiphisternum and was made worse if he sat upright or attempted to take a deep breath. Clinical examination showed no evidence of an intrathoracic or cardiac lesion and a confident diagnosis of muscle strain was made. The pain was quickly relieved by strapping. In reply to a questionary in 1949 he stated that he had had no recurrence.

The following case illustrates a difficulty which may arise when pain in the chest radiates to the shoulder.

Case 3

A woman aged 38 complained of pain in the region of the xiphisternum radiating to the left shoulder and associated with breathlessness. The pain came on while carrying a carpet up some stairs. It was of sudden onset and was so severe that she had to sit on the stairs until she could be helped to bed by her husband. After the first attack the pain recurred over a period of an hour whenever she tried to breathe normally, and she was forced to take shallow respirations, with a consequent feeling of dyspnoea. No abnormality could be found when she was examined a fortnight later, and it was felt that the history was sufficiently indicative of a strain of the diaphragmatic attachments to the chest wall to prevent any serious doubts about the diagnosis. If, however, a similar symptom occurred in a middle-aged man, difficulty might arise unless a detailed history were taken. The patient might well have had an attack of angina while carrying the carpet upstairs, but the differentiating points were the sudden stabbing nature of the pain and its relation to the act of breathing.

The more chronic cases may follow immediately on some acute strain or injury, or there may be a considerable interval between the trauma and the onset of angina-like pain, so that it is only on specific questioning that the patient may recall the injury.

The effect on the heart of non-penetrating injuries in the region of the praecordium has recently received much study, and there is no doubt that serious cardiac damage may occasionally result from trauma in this area. It is much more common, however, for a cardiac neurosis to be engrafted on to a local chest-wall pain or for the pain to be a local traumatic one which simulates angina by its relation to exertion. It is possible that some of the cases described in the literature as angina following trauma are in reality of this type. In perusing the case records of Warburg (1938), who described 197 cases of heart disease following trauma, one is impressed by the fact that chest-wall pain is not mentioned as a differential diagnosis even in those who showed no electrocardiographic changes, though from the facts given in many of the histories it would be quite adequate to explain the patients' symptoms.

Many cases follow on some unaccustomed activity at work or in the pursuit of a hobby, and the pain may very closely mimic angina of effort. It may arise in the pectoral or intercostal muscles and may radiate down the arm. It is never referred up into the neck or to the jaw, such a radiation being almost pathognomonic of true angina. It is often associated with tenderness and with increased pain on movement against resistance. Breathing usually makes the pain worse, and it is noteworthy that expiration is often more painful than inspiration. Sudden unexpected movements are very likely to increase the pain, and postural change may make it worse. The length of history in these cases is often enough, taken in conjunction with the patient's general condition, to exclude coronary disease, as in the following case in which the pain had been present for ten years.

Case 4

A man aged 58 was seen in 1949. He gave a history of injury to his chest and back when he fell between two joists ten years ago. The ribs were not broken, but he had some left-sided chest pain for many months after this. The pain returned

five years later and, because of its radiation down the left arm and its relation to exertion, was diagnosed as angina. Trinitrin was said to have given relief. He had been advised to retire from business and had since led a life of semi-invalidism.

On further questioning it was disclosed that the pain was made worse when the head was bent backwards, and that it was affected by movement of the left arm. It was worse on lying on the right side and eased by lying on the left. It was also made worse by breathing and by putting on his coat. Standing caused more pain than walking, and shaving was particularly troublesome. His easiest position was when he was bending forward. When questioned about the alleged response to trinitrin, it transpired that he felt some relief ten minutes to a quarter of an hour after taking a tablet, so that it is probable that some other factor was really responsible for the improvement.

There was no local tenderness, but pain could be induced by torsion of the trunk or on pressing with the left arm against resistance. A radiograph showed some osteoarthritic changes in the mid-dorsal spine but no disease in the chest. The cardiac outline was normal, and the electrocardiogram was normal in the limb and chest leads.

Physiotherapy failed to give him complete relief, and when reviewed six months later he still complained of some pain on standing, probably due to the arthritic spine; but he was back at work and much happier.

Case 5

A man aged 52 was seen in June, 1947. Two weeks previously he had been gardening and had clipped grass with shears in a confined space between two frames. On waking next morning he had pain at the lower end of the sternum. This pain lasted three days. It was a steady ache made worse by deep breathing and by postural change in bed, and though he was not shocked his doctor had diagnosed coronary infarction and had given him some morphine.

When seen on the third day there was no evidence of cardiovascular disease and the electrocardiogram in the three standard leads showed no abnormality. There was no local tenderness, but the pain could be elicited by adduction of the arms as in the movement of clipping with shears. A diagnosis of chest-wall pain was made, and he was advised to return to work. He was reviewed a week later, when he stated that he had been weeding in his garden for a quarter of an hour and while stooping the discomfort in the chest had reappeared. He described it as a slight ache or tightness which lasted some hours until he went to bed.

In February, 1948, a follow-up showed that he had had no further trouble in spite of gardening and golf, and the electrocardiogram was still normal. In April, 1949, in reply to a questionary he stated that he was entirely free from symptoms in spite of full activity.

It is difficult to locate the structures involved in the production of his pain, but it is probable that the site of origin was in the diaphragmatic attachments of the chest wall.

Fibrositis

Fibrositis is a term used loosely for a condition characterized by integumental pain without any known gross pathology. It is probable that we are now getting nearer to an understanding of its pathology on the lines suggested by Copeman (1949). The majority of cases seen in this group have a tendency to obesity. The pain is of a constant aching type, with exacerbation on movement, particularly where the movement is sudden and unexpected. Even though it is widespread it is associated with focal tenderness, and sometimes actual nodules may be felt, particularly over subjacent bone. The tendernesss is best elicited with the finger-tips, and it is often so localized that it may be missed if the fingers are not carefully run along the intercostal spaces as well as over the ribs and sternum. Pressure on the tender spots is so painful as to make the patient wince. This is quite different from the generalized tenderness of the chest wall found in cases of coronary infarction, in which a wide area of tenderness is commonly associated with some skin hyperaesthesia.

Kellgren (1947) points out that pressure on the deep tender spot causes a steep increase in pain together with referred tenderness, and states that the deep tender spot often lies altogether outside the distribution of the pain. It is therefore very likely to be missed if search is confined to the area which the patient describes as painful. The pain may mimic angina of effort very closely when the intercostal muscles in the region of the sternum are affected, particularly as the pain may radiate down the arms.

Infiltration of the tender area with a local analgesic is usually sufficient to cure a local fibrositis, but heat with massage is required for the more widespread form.

Five cases in the group under review were in obese women who complained of breathlessness on exertion and pain in the region of the sternum. The tenderness was limited to an area about 3 in. (7.6 cm.) in diameter where the breasts join the sternum, and appeared to be localized to the fatty tissues; these cases would therefore be more accurately described as panniculitis. It is these cases which tend to acquire the label of fatty heart because of the breathlessness and pain, and the diagnosis is still further clouded if thyroid medication has been instituted for the obesity, as this often adds palpitation to the patient's list of symptoms. Treatment with diet for the obesity is the keynote of treatment, though physiotherapy may be of some value.

Case 6

A woman aged 40 complained in 1948 of tightening across the chest over a period of three or four years. The pain felt like a tight squeezing in the upper part of the chest with some radiation down the left arm. The first attack had come on when walking and carrying some groceries. It had been diagnosed as angina, and her activities had been curtailed.

On questioning it had been found that though she had periodic attacks of pain there was a constant residuum of discomfort in the third intercostal space, and the attacks of pain that had come on were of a stabbing nature and left increased soreness behind them. It was impossible to take a deep breath during the attack. Posture had no effect. She was able to walk without pain, but some of her domestic duties were apt to bring it on, particularly scrubbing or using the vacuum cleaner. There was extreme local tenderness in the third intercostal space on the left and no evidence of cardiovascular disease. She was treated with physiotherapy and a reducing diet, and one year later in reply to a questionary she stated that she was better but that she had occasional recourse to heat and massage, a procedure which was always effective if her pain threatened to return.

Case 7

A woman aged 63 stated in 1948 that five months previously when walking quickly, she had had sudden pain at the lower end of the sternum. It was quite localized, and was worse on breathing. She had rested on a wall for ten minutes and then went home to bed. The pain had persisted for a few days and a diagnosis of coronary thrombosis had been made. On questioning she stated that during her stay in bed the pain had been worse on taking a deep breath and on turning or raising herself from the pillow. Since then she had had a return of pain after activity such as cleaning out a cupboard. Ordinary exertion such as walking did not affect it. When seen she still had local tenderness in the region of the xiphisternum and on both sides of the lower end of the sternum. She was rather over weight. No disease was found in the cardiovascular system. She was reassured about her heart and given a reducing diet, and in reply to a questionary one year later she stated that she was quite well.

Kyphoscoliosis

The cases in this group are of particular interest, as they may very closely mimic cardiac pain and may be associated with breathlessness due to the deformity and fixation of the chest. It is a common thing for symptoms to appear for the first time in middle life, owing presumably to some further alteration in structure or to osteoarthritic changes in the spine.

The pain may be due to root pressure, to local pressure between the ribs, or to intercostal cramp. Posture plays a large part in its production, and it may come on in bed when sleeping in some unsatisfactory position. It commonly occurs, however, on standing, or on sitting for a long time in one position, as in driving a car. Many cases with a moderate degree of occupational stoop come into this category, and their pain is usually due to muscle fatigue, with resulting ligamentous strain.

These cases differ from other types of chest-wall pain in that there is no extreme local tenderness, and it may be impossible to reproduce the pain on movement during the examination because fatigue or relaxation of muscle tone plays a part in its causation.

One must be on guard, however, in these cases, as pain may be too readily ascribed to deformity when in fact there is some other cause. This was so in two cases, formerly included in this group, which during a follow-up were found to have had posterior gastric ulcers, one of them malignant. One patient had died and the other had lost his pain after operation. In both cases the pain had been of typical anginal distribution but had also been closely related to posture, and both had a severe kyphoscoliosis, which had seemed adequate to explain the symptoms.

Patients in this group may give a history of increasing pain going back many years with clear intervals of months. The chief reliance in diagnosis should be placed on the relation of pain to posture and to the nature of the pain itself. This is of two types—a dull aching pain and occasional sudden stabs followed by an increasing ache suggesting periodic pressure on nerves.

Case 8

A mining engineer aged 51 was seen in 1947. He gave a history of pain in the left side of the chest of one month's duration. It came on originally during a long motor journey and caused him to go to bed. It was of a dull aching type with exacerbations like a knife-thrust, particularly on taking a deep breath. The pain was felt over most of the praecordium and to some extent in the left shoulder-blade and on twisting movements of the trunk. It was associated with breathlessness on exertion. It was relieved by rest in bed, and he was referred as a case of coronary disease.

On examination there was no evidence of disease in the cardiovascular system. There was pronounced kyphoscoliosis with crowding of the ribs on the left side, but no local tenderness in the chest wall. The pain could be increased by firm lateral pressure on the left side of the chest. A radiograph showed severe osteoarthritic changes in the spine, and a diagnosis of spondylitis with referred pain was made. He was treated for some weeks on fracture boards and then referred for remedial exercises. When reviewed in February, 1948, he was looking and feeling much better and had changed his work to employment requiring no stooping. There was still some pain on deep breathing and occasional aching precordial pain when tired, relieved by pressing firmly back into a hard chair.

Discussion and Conclusion

A detailed history is of paramount importance in all these cases, and due regard should be paid to a family history of coronary thrombosis. The exact conditions in which the pain occurs should be checked and counter-checked, and the time relations of the pain should be ascertained. The factors which bring relief must also be considered, and, in particular, relief from change of posture is important.

Relief from trinitrin should not be accepted without inquiry about the interval before relief is obtained, as this is sometimes half an hour or more, or in any case too long for a drug to be really responsible for the improvement.

Pain induced by excitement and anger is most unlikely to be of chest-wall origin, and this is therefore a most important differential point.

Pain arising in the chest wall has certain characteristic features, the most important of which is local tenderness, particularly in fibrositic cases. In these cases the tenderness is well localized, sometimes to small discrete areas which can best be felt with the finger-tips. These tender spots may be on the surface of the ribs or sternum or may be in the intercostal spaces, and the pain elicited is acute when the exact spot is found.

The second characteristic of pain arising in the chest wall is related to movement. This is especially pronounced in those pains associated with muscle strain and fibrositis The pain is made worse on initiating movement before any real exertion is involved, and it may be made worse by turning in bed or on reaching towards a bedside table.

The question whether a patient's pain is made worse on turning in bed is probably the most important question to ask in these cases of chest-wall pain simulating coronary disease. A patient with acute coronary infarction may find that turning in bed is painful, but it is more the change of posture than the actual initiating movement of turning which causes the increased pain ; many patients state that their pain comes on in bed when they really mean that it comes on when turning in bed.

Chest-wall pain, though usually related to specific movement, may be increased on general exertion if this involves increased respiratory effort. True anginal pain is usually felt long before there is sufficient dyspnoea to increase respiratory movements.

Pain associated with kyphoscoliosis is often made worse by certain postures in bed, and patients with such a condition may wake up with pain suggesting a coronary lesion as the result of lying in some awkward position. Clinical examination, however, is usually sufficient to differentiate these cases.

The third most important point about chest-wall pain is the possibility of reproducing the pain by particular movements of the trunk against resistance. This is true particularly of pain arising as the result of muscle strain, but a detailed history will usually relate the onset of pain to some specific exertion in the past.

In all cases emphasis must be laid on the detailed history, and in many the length of the history taken in conjunction with the clinical findings is enough to exclude coronary disease.

In spite of a detailed history and careful clinical examination there remain some cases of pain referred to the chest wall in which the diagnosis will remain in doubt, and only full electrocardiographic examination before and after exertion will serve to make the position clear.

The difficulty arises from two factors—local tissue changes in an area of referred pain and the phenomenon of summation of pain. Davis and Pollock (1932) have suggested that trophic disturbance in the area of referred pain may produce local tissue changes, with resulting areas

of tenderness, and Steinbrocker *et al.* (1948) have described the painful stiff-shoulder syndrome in coronary disease. There is no doubt that fibrositic lesions of the chest wall and painful shoulder-joints are very common accompaniments of coronary disease, and it would be interesting to know how many of these patients are to be found attending orthopaedic clinics, their cardiac condition undiagnosed.

The summation of pain from the heart with pain arising from some local condition in the chest wall introduces a further difficulty in diagnosis, and Cohen (1947) has postulated this explanation of some cardiac pain being referred to particular areas of the same segmental supply. An old gunshot wound or some area of fibrosis may become the focal point for the expression of an underlying cardiac pathology; it is therefore important to realize the danger of being too readily satisfied with a local chest-wall explanation of a patient's symptoms in any case where he is a potential sufferer from heart disease.

The reverse mistake of diagnosing heart disease when the trouble lies entirely in the chest wall is, however, more frequent and disastrous. It might well be said that it is better that one patient should suffer a sudden cardiac death within a few hours of a reassuring prognosis than that one should go through life with a mistaken label of cardiac disease.

In elderly patients who have a doubtful chest pain and some arteriopathy no serious harm is done by reasonable limitation of activity on general grounds, but cases in the younger age group demand a more accurate diagnosis, and if after complete investigation there remains some doubt it is much better that the heart should be passed as normal.

Summary

The differential diagnosis of chest-wall pain is discussed and stress is laid on the need for due consideration to be paid to local structural causes as well as to the possibility of an underlying cardiac pathology. Some illustrative cases are briefly described.

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In the U.S.A. the Communicable Disease Centre is the division of the Public Health Service responsible for providing assistance to State health departments in meeting public health emergencies. According to Surgeon-General L. A. Scheele the most extensive investigation carried out by the Centre in 1949 was in Muskegon, Michigan, in August and September. An epidemiological team composed of 12 persons conducted there one of the most thorough studies ever made of a community in connexion with a poliomyelitis epidemic. Some phases of this research are to continue for several years. "An interesting feature of the poliomyelitis investigation in Arkansas in August," Dr. Scheele said, "was the use of a 'circuit rider,' not unlike the preacher on horseback who toured rural areas of the South around the turn of the century. The 1949 circuit rider in this case was a public health representative. He made rounds three times a week, collecting from field workers certain important specimens for laboratory study." A physician-veterinarian team was sent from the Communicable Disease Centre to investigate a baffling epidemic which afflicted human beings and horses at the same time last August and September in Colorado. They found that two virus diseases existed simultaneously, creating a complicated diagnostic problem. Poliomyelitis was prevalent among human beings at a time when encephalitis was occurring in both man and horses.

CANICOLA FEVER IN BRISTOL

CLINICAL, BACTERIOLOGICAL, AND EPIDEMIOLOGICAL NOTES ON SIX HUMAN CASES

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Canicola fever is an acute infective disease caused by *Leptospira canicola*. This organism belongs to the same genus as *L. icterohaemorrhagiae*, which produces Weil's disease (leptospiral or infective jaundice), and is normally a parasite of dogs. It occasionally infects man, giving rise to an illness which may simulate influenza or meningitis, and which may be accompanied or followed by eye symptoms. The prevalence of the condition in the Low Countries has been demonstrated by a number of workers since the species was first isolated there by Klarenbeek and Schüffner (1933), but its existence in this country has been appreciated only within recent years. We here record six cases to add to the six previously reported in Britain by Baber and Stuart (1946), Laurent *et al.* (1948), and Weetch. Colquhoun, and Broom (1949).

In two of our cases canicola fever was not diagnosed during the febrile attacks, and was suspected only when ocular complications supervened. The patients, a husband and wife, were referred to the Bristol Eye Hospital on August 10, 1949, both complaining of dimness of vision in one eye following an influenzal illness. They were found to be suffering from iridocyclitis, and were sent on August 22 to the medical clinic of the hospital for complete examination by one of us (A. M. G. C.). When the history of the febrile attacks was reviewed it was noted that both patients had been nursing a sick dog before the onset of the illness. The husband, an engineer, constantly had abrasions on his hands, and the wife had a cut finger at that time.

The possibility that the pyrexial attacks had been canicola fever was considered, and specimens of serum were tested for the presence of antileptospiral antibodies. The sera of both patients agglutinated *L. canicola* to high titre, so confirming the retrospective diagnosis of the cause of the febrile illnesses and the iridocyclitis.

These cases occurred in a so-called "squatters' camp." The term is likely to convey a completely wrong impression of the general hygiene and living conditions—which in fact are very good—so it will not be used. The community, inhabiting former American Army huts, was relatively circumscribed, and through the co-operation of its members we were able to investigate the agglutination reactions and to make ophthalmoscopic examinations of most of the adults. Serum from all the dogs on the site was also tested. The results obtained, and certain conclusions we think may be drawn from them, seem of sufficient interest to be given in some detail.

Four other cases which occurred recently in Bristol are described also. These patients had no known association with each other or with those already mentioned, although two of them live in the district in which the "camp" is situated. Their inclusion, however, gives a more complete picture of the disease in that city, and in addition one of them illustrates a different method of contracting the infection.

Disease in Man

The reports of the primary attacks of the first two cases are rather scanty because they were not treated in hospital and no written records are available. Both patients, however, gave every help in trying to make the information as accurate as possible.

Case 1

Mrs. A., aged 29, had a febrile illness which began abruptly on June 21, 1949, and was accompanied by very severe headache of meningeal type, pains in the neck and limbs, marked conjunctival injection, nausea, and vomiting. The fever ran a somewhat relapsing course over a period of 10–14 days, during which time the patient was severely ill; in all she was confined to bed for three weeks. On the eleventh day an erythematous rash appeared on the trunk and limbs, but this faded within twenty-four hours. On the thirteenth day she complained of dimness of vision affecting the nasal field of the left eye, which was red and inflamed. Spots and haziness in front of the eyes were also noted.

Eye Examination (F. Clifton).—On August 10 (51st day) the right eye was healthy. The left eye presented signs of low-grade iridocyclitis, and there were a few medium-sized grey keratic precipitates, occasional cells in the aqueous, and a slight flare, with a few flake-like opacities in the vitreous. The retina and choroid seemed normal. There were no visual field defects.

On August 22 (63rd day) the patient was free from all signs and symptoms except the above ocular disturbances. Blood examination showed: leucocytes, 7,800 per c.mm. (polymorphs 55%, eosinophils 4%, basophils 1%, lymphocytes 35%, monocytes 5%). Wassermann reaction and Kahn test were negative. The urine was normal on examination. Serum agglutinated *L. canicola* in dilutions of 1 in 3,000.

Case 2

Mr. A., a Post Office engineer aged 33, was taken suddenly ill on July 14, 1949. The symptoms and course of the complaint resembled those of Case 1, but pain and tenderness of the abdominal muscles were outstanding features. Vomiting was marked, and colicky pains accompanied by severe diarrhoea occurred on the seventh and eighth days of the disease. The total duration of his illness was about three weeks. On July 20 (7th day) photophobia and diminution of vision were noted in the left eye, which was red and painful.

Eye Examination (F. Clifton).—On August 10 (28th day) the right eye was healthy. The left showed iridocyclitis, numerous fine to medium-sized grey keratic precipitates, a faint injection of the iris, cells and a moderate flare in the aqueous. The vitreous showed a generalized haze and a number of filamentous floating opacities. The fundus appeared normal except for the presence of a small inactive paramacular pigmentary disturbance, which did not cause any detectable scotoma in the visual field.

On August 22 (40th day) this case presented exactly the same appearances as Case 1. Blood examination showed: leucocytes, 5,800 per c.mm. (polymorphs 40%, eosinophils 6%, basophils 1%, lymphocytes 48.5%, monocytes 4.5%). The urine was normal, and the blood Wassermann reaction negative. Agglutination tests with *L. canicola* were positive to a titre of 1 in 10,000.

Case 3

A schoolgirl aged 13 developed severe frontal headache on May 23, 1949, followed on May 25 by abdominal pain and vomiting. These symptoms persisted, and on May 27 (5th day) stiffness of the neck was noted; the patient was sent to hospital as a possible case of cerebrospinal meningitis.

On admission on May 27 the temperature was 100.4° F. (38° C.) with a pulse rate of 100 a minute. The patient appeared ill, and neck rigidity was pronounced, with a positive Kernig's sign and some enlargement of the axillary lymph glands. There was tenderness in the left iliac fossa. The eyes and conjunctivae appeared normal, and clinical examination revealed no further abnormalities.

Investigations.—Blood: Leucocytes, 8,000 per c.mm. (polymorphs 76%, lymphocytes 20%, monocytes 4%). Cerebrospinal fluid: Clear, colourless; 20 cells per c.mm. (lymphocytes 93%); total protein, 30 mg. per 100 ml., no excess of globulin; chlorides, 680 mg. per 100 ml.; sugar present; no bacteria seen in films; culture sterile. Urine normal, and sterile on culture.

Treatment was begun with sulphathiazole, 1 g. every four hours.

On May 29 (7th day) lateral nystagmus was noted in both eyes, but temperature and pulse were normal; abdominal pain, headache, and neck rigidity had disappeared, and Kernig's sign was negative. On May 30 the temperature was 101.2° F. (38.4° C.) and the pulse rate 90 a minute; nystagmus was still present. Headache and vomiting returned, and pharyngitis and conjunctival injection developed. Sulphathiazole was stopped, and penicillin substituted in a dosage of 200,000 units daily.

On May 31 (9th day) the conjunctival suffusion was less severe and the patient felt much better. A blood sample taken that day agglutinated *L. canicola* to a dilution of 1 in 30 (see Table). By June 3 (12th day) all symptoms had abated. Convalescence thereafter was slow but uninterrupted, and the patient was discharged on July 4 (43rd day).

Serum Agglutination Reactions of Cases 3 and 4

	Reciprocal of Titre with *L. canicola*		
Case 3 ..	30 (9)	300 (16)	10,000 (30)
Case 4 ..	30 (13)	300 (19)	1,000 (26)

The day of disease on which specimen was taken is shown in parentheses.

An unsuccessful effort was made to trace the source of the infection. Blood from a dog in the patient's house was negative for leptospirosis. A neighbour's dog had been sick and showing eye symptoms shortly before the onset of the child's illness, but it had been killed accidentally during the early part of the girl's stay in hospital.

Case 4

This patient, a schoolboy aged 11, who had often bathed in the River Frome, a very stagnant stream, became suddenly ill on July 14, 1949, with severe frontal headache and persistent vomiting. The boy was taken into hospital on July 21 (7th day) as a possible case of cerebrospinal meningitis.

On admission his temperature was 98.8° F. (37.1° C.) and the pulse rate 100 a minute. The patient was moderately ill and complained of headache. There was some neck rigidity, and Kernig's sign was positive, but no other signs of cerebral involvement were present.

Investigations.—Blood: Leucocytes, 8,000 per c.mm. (polymorphs 73%, eosinophils 2%, lymphocytes 21%, monocytes 4%). Cerebrospinal fluid: Clear; 180 cells per c.mm. (lymphocytes 66%); total protein, 65 mg. per 100 ml., with increased globulin; chlorides, 710 mg. per 100 ml.; sugar present; sterile on culture.

Treatment with 200,000 units of penicillin daily was begun, being continued until July 28 (14th day). On July 22 headache was still severe, and neck rigidity persisted. Blood taken on this day showed a low positive agglutination titre with *L. canicola* (see Table). On July 25 (11th day) the symptoms were beginning to abate. The lumbar cerebrospinal fluid contained 15 cells per c.mm. (lymphocytes 95%, polymorphs 4%, monocytes 1%); total protein, 10 mg. per 100 ml.; chlorides, 750 mg. per 100 ml.; sugar present; culture sterile. By July 27 (13th day) all symptoms had disappeared, and he made an uninterrupted recovery.

Case 5

A schoolgirl aged 15 had a febrile attack on October 2, which at first responded to treatment with salicylates. On

October 9, however, she developed a severe frontal headache, and her temperature rose rapidly. She was admitted to hospital as a suspected case of anterior poliomyelitis.

On admission her temperature was 101° F. (38.3° C.), pulse rate 86 a minute, and respirations 20 a minute. Neck and spinal rigidity was present, and Kernig's sign was positive. A cardiac systolic murmur was heard in the mitral area, the sequel to an attack of rheumatic fever 10 years previously. There were no disturbances of reflexes, no muscular weakness, and no abnormalities in the other systems.

Investigations.—Cerebrospinal fluid: Leucocytes, 780 per c.mm. (lymphocytes 90%, polymorphs 10%); total proteins, 65 mg. per 100 ml., with excess globulin; chlorides, 730 mg. per 100 ml.; sugar present; no organisms in stained films; culture negative. The serum agglutinated *L. canicola* to a titre of 1 in 300.

On October 10 (9th day) the temperature returned to normal; the headache and the neck and spinal rigidity improved, and had cleared completely by October 12. On October 14 (13th day) the temperature rose again to 103° F. (39.4° C.) and fever continued for three days. During this period nothing abnormal was found on examination of the central nervous system, but on October 17 (16th day) the cerebrospinal fluid contained 275 cells per c.mm. (lymphocytes 89%, polymorphs 10%, monocytes 1%). Thereafter the patient made a slow but uninterrupted recovery, and was discharged on November 15 (45th day). A specimen of serum agglutinated *L. canicola* at 1 in 1,000.

A dog belonging to the patient's household had been sick, with suffused eyes, about two weeks before the onset of the child's illness. The dog had had to be destroyed, so it was not possible to determine whether it was the source of infection.

Case 6

A railway employee aged 31 had a shivering attack on December 10, 1949. Next day he complained of severe frontal headache, and pains in the back, knees, calf muscles, and ankles. He had a dry persistent cough. During the next two days these symptoms continued, and profuse night sweats occurred. He was admitted to hospital on December 14.

On admission his temperature was 103° F. (39.4° C.), pulse rate 98 a minute, and respirations 28. The patient was acutely ill, pale, and in obvious pain. There was marked suffusion of both eyes. The axillary lymph glands were palpable on both sides. Movement of the right side of the chest was diminished; numerous rhonchi were heard throughout the lung fields and "sticky" rales over the left base posteriorly. No other abnormalities were noted during the clinical examination.

Investigations.—Blood: Leucocytes, 14,000 per c.mm. (polymorphs 76%, lymphocytes 24%). The urine contained albumin and granular and hyaline casts. A specimen of serum showed no leptospiral agglutinins.

Treatment with 200,000 units of penicillin daily was begun on admission and was continued for 14 days.

The temperature fell by lysis, and had reached normal by December 16 (7th day), but the headache persisted. Next day it became much worse, and was frontal and retro-orbital in position. The temperature rose to 100.6° F. (38.1° C.); the pulse rate was 96 a minute and respirations 28. Neck and spinal rigidity developed, and Kernig's sign was positive. Lateral nystagmus was present in both eyes. Cerebrospinal fluid: Clear; 225 cells per c.mm. (lymphocytes 79%, polymorphs 20%, monocytes 1%); total protein, 170 mg. per 100 ml.; sugar present; globulin increased; chlorides, 700 mg. per 100 ml.; no organisms seen in films; cultures sterile.

On December 18 (9th day) the temperature fell to normal, but the meningeal signs and symptoms cleared only slowly. The neck and spinal rigidity did not finally disappear until January 1, 1950 (23rd day). On this date the serum agglutinated *L. canicola* in dilutions up to 1 in 1,000.

On December 23 (14th day) the cerebrospinal fluid contained 250 cells per c.mm. (lymphocytes 81%, polymorphs 18%, monocytes 1%); total proteins, 130 mg. per 100 ml., globulin in excess: chlorides, 715 mg. per 100 ml.; sugar present.

On January 5, 1950 (27th day), the cerebrospinal fluid findings were: cells, 35 per c.mm. (lymphocytes 83%, polymorphs 16%, monocytes 1%); total protein, 50 mg. per 100 ml., with slight excess of globulin; chlorides, 740 mg. per 100 ml.; sugar present; no organisms were seen in films, and cultures remained sterile. At the time of writing (28th day) he still complains of frontal headache in the morning, but his general condition is good, and he is allowed out of bed.

The patient owns a dog which became ill with "distemper" some three weeks before the onset of the man's symptoms. The dog's conjunctivae were noticed to be yellow, and were covered with a film of mucus. The animal recovered but relapsed later, and on January 9 was again acutely ill. Serum taken from the animal at that time agglutinated *L. canicola* in dilutions up to 1 in 10,000, from which it can reasonably be assumed that the man's illness was contracted from his dog.

Disease in Dogs

A bitch belonging to the first two patients suffered from an attack of fever, with gastritis and vomiting, in December, 1948. It is impossible now to decide whether this was leptospirosis, but the animal's serum agglutinated *L. canicola* to a titre of 1 in 100 when tested in September, 1949. At that time no leptospires could be demonstrated in the urine either by microscopical examination or by inoculation into hamsters. The same bitch produced a litter of six puppies on April 20, and both patients of course had often to mop up pools of urine. In September the sera of the two remaining puppies had positive titres of 1 in 1,000 for *L. canicola*, and leptospires were seen on more than one occasion in the urine of one puppy. Urine was inoculated into hamsters, but only after treatment with penicillin had inadvertently been carried out, and no strain was isolated.

At the age of 5 weeks this puppy developed an abscess of the neck, and was under the care of one of us (K. C. S.) up to June 12. This has no aetiological significance, but it enables us to state quite definitely that neither bitch nor puppies showed any systemic disturbance. The importance of this point will be considered later, in relation to the carrier state.

Epidemiological Investigations

The living quarters of the families in the colony may be compared to the single-story prefabricated houses which are a common feature in bomb-damaged towns. The huts, substantially built of wood and raised two to three feet (60–90 cm.) above the ground, are provided with water and electricity. Sanitary arrangements are perfectly adequate. Separate rooms have been partitioned off, the interiors freshly decorated, and the rooms well furnished. The houses and attached gardens reflect the pride the inhabitants obviously take in their homes. The general conditions, indeed, appear much better than those found in many parts of industrial towns. This is important, because we think it makes our findings applicable in many ways to the community at large.

Survey of Canine Sera.—The sera of the other 10 dogs belonging to the colony were examined for the presence of leptospiral antibodies. Of these, seven (one being the father of the litter already mentioned) agglutinated *L. canicola* and three were negative. The positive titres were 1 in 100 for five dogs and 1 in 300 for two. To obtain some evidence of the general incidence of canine leptospirosis in Bristol, sera from a further six healthy dogs living at considerable distances from the camp were tested also. Positive titres of 1 in 100 were found in three and negative reactions in the rest.

Survey of Human Sera.—Blood samples from 43 adults living in the camp were examined in the same way. In every case the result was negative, showing that no other

human cases had occurred among grown-up persons in spite of the high rate of infection in the dogs. We had hoped to complete the survey by examining specimens from all the children. Unfortunate publicity, however, caused a change from the early co-operation which we received, and the project had to be abandoned. The close association between children and dogs would have made this information of great value, and it is very regrettable that we were unable to obtain it.

Discussion

The six cases outlined above illustrate the rather nebulous nature of the clinical picture in canicola fever. The features shown in common by these patients were the sudden onset of a febrile attack, which lasted for a week or more and was accompanied by conjunctival injection, very severe headache, some neck rigidity, muscular pains, and signs of alimentary disorder.

The relative severity of the different symptoms in individual cases may easily suggest a diagnosis of influenzal meningitis or poliomyelitis, or even some abdominal catastrophe, and cases of leptospirosis have been found in surgical wards. Jaundice, although rarer in canicola fever than in Weil's disease, may be present to complicate the picture still further.

A similar problem is often presented by the non-icteric meningeal form of Weil's disease, in which condition ocular or neurological manifestations may also occur. The value of these eye signs in indicating the correct diagnosis is seen in the first two of our cases.

The occurrence of the meningeal variety of Weil's disease was recognized by Costa and Troisier (1916), and the condition has been intensively studied by a number of French observers, who refer to it as "spirochétose méningée pure." This form has also been reported from many other countries, and the frequency of its recognition probably depends, as Walch-Sorgdrager (1939) suggests, on the degree of interest in leptospirosis shown by clinicians. Our last four cases demonstrate that this is equally true of canicola fever.

Scheid (1949) has recently reviewed the literature dealing with the neurological complications of leptospirosis, and he notes the following: subarachnoid haemorrhage, which is probably an indication of the haemorrhagic tendency of the disease; paralysis of facial, palatal, and oculomotor nerves; brachial and sciatic neuritis; paralysis of voluntary muscles of the legs.

Hegler (1936) describes two cases of Weil's disease: in one of these tetanic spasms occurred; in the other the original diagnosis was transverse myelitis. The latter patient suffered from paraplegia and paralysis of the bladder; recovery was very slow, and was still incomplete after 12 months.

The eye changes in Weil's disease were reviewed by Buzzard and Wylie (1947) and by Coutela (1948). Photophobia and injection of the conjunctivae are common, and a number of other symptoms, including mistiness of vision, diplopia, iritis, iridocyclitis, irregular pupils, papilloedema, vitreous opacities, nystagmus, optic neuritis, and retrobulbar neuritis have been described.

Optic neuritis, associated with iridocyclitis or choroiditis, occurs during convalescence. Though vision is usually markedly affected, it may be good even in the presence of a severe lesion. Bilateral papilloedema has been observed in the mild meningitic form of the infection due to *L. icterohaemorrhagiae*. The prognosis of the ocular symptoms is good with adequate mydriatic treatment. This was demonstrated in Cases 1 and 2 of our series.

The literature on canicola fever is much less extensive, but ocular and nervous symptoms have been reported. So far as can be judged they seem to occur with relatively greater frequency than in true Weil's disease.

The differential leucocyte counts deserve some comment, because they were carried out at different stages of the disease. It is well known that by the end of the first week the relative proportion of polymorphs is high, reverting to normal later. In many cases also the eosinophils disappear during the early stages and reappear as the severity of the illness diminishes, as occurred in our cases.

For the treatment of canicola fever no specific antiserum is available, and the sulphonamides are inactive. Penicillin, however, seems to exert a beneficial effect in some instances at least. For example, the cases recorded by Baber and Stuart (1946) and by Mackay-Dick and Watts (1949) were apparently improved by penicillin, and the course of the disease in our third case may have been modified by the drug. On the other hand, the fatal case described by Weetch *et al.* (1949) showed no response; though it should be noted that this patient died of uraemia, and that the leptospiral nephritis was superimposed on previously damaged kidneys, so that the effect of penicillin cannot be fully estimated. In Case 6 of our series, however, penicillin, begun on the fourth day and continued for 14 days, did not prevent a recrudescence of fever during treatment. Spontaneous recovery is the rule in human infections, and the number of cases treated is small; therefore much more evidence is needed before a definite decision about the value of penicillin can be reached.

The position is more clear-cut in the case of dogs, because canicola fever often produces a severe and rapidly fatal disease in this animal. As was first shown by Joshua and Freak (1947), early administration of penicillin is followed by dramatic clinical improvement. This is in marked contrast to the relative ineffectiveness of the drug in "yellows" (caused by *L. icterohaemorrhagiae*), in which liver damage is the outstanding feature. If administration of penicillin in canicola fever is not begun during the septicaemic stage—approximately the first five to seven days—and the leptospires have already established themselves in the kidney tubules, the infection cannot be eradicated. Brunner and Meyer (1949) found, however, that streptomycin, in doses of 40 mg. per kg. for three to four days, would eliminate the organisms completely from the kidney, even at that late stage.

In this connexion the case of Weil's disease described by Moreau *et al.* (1947) is of interest. On the sixth day of illness the patient was heavily jaundiced and showed signs of marked renal involvement, with albumin and casts in the urine, oliguria, and a blood-urea level of 210 mg. per 100 ml. Treatment with penicillin was begun on that day, and a distinct change for the better in the kidney condition was noticeable two days later, the output of urine rising to 3 litres. After a few days albumin had disappeared from the urine, and by the 12th day the blood urea had fallen to 25 mg. On the other hand, the jaundice and the liver enlargement were quite unaffected.

In addition to the gravest form, all lesser degrees of severity of *L. canicola* infection occur in dogs, and there is also a healthy carrier state. In these latter types of infection leptospires in large numbers may be shed in the urine for some months, the animals constituting a danger both to man and to other dogs. *L. canicola* has a very high infectivity for dogs, though the virulence of different strains seems to vary greatly. Stuart (1946) and Joshua and Broom (1949) found serological evidence of past infection in some

40% of unselected urban dogs in Glasgow and London respectively. The results we obtained in Bristol show that the incidence is at least as high in that city. Borg-Petersen (1949) found *L. canicola* much less common in country as compared with town dogs in Denmark, but Broom and MacIntyre (1948) noted only a suggestive, not a significant, difference between these two groups in England.

When one considers that we found nothing to suggest that any other cases had occurred among adults in the camp, two conclusions seem justified. First, that the infectivity of *L. canicola* is low for man, and, secondly, that something more than the usual association between dog and man is necessary to cause human infections. Our cases illustrate two of the factors which may be responsible. The first two patients had both frequently mopped up pools of urine made by puppies which were apparently healthy but were, in fact, carriers. As was noted above, the woman had a cut finger, and the man constantly suffered minor hand injuries at work. It has been proved experimentally that leptospires can gain entrance to the body through cuts and abrasions, and such were doubtless the portals of entry in these two instances.

On the other hand, Case 4 had often bathed in a stagnant river, and it is well recognized that true Weil's disease may be contracted by bathing in stagnant fresh water fouled with rat urine containing *L. icterohaemorrhagiae*. Evidence is accumulating that canicola fever also can follow bathing —presumably because of contamination with infected dog urine. One cannot altogether rule out the possibility of infection through skin abrasions in bathing cases, but Romijn (1932) remarked that many of his patients used swimming strokes that kept eyes and nose much under water. Buzzard and Wylie noted that inflammation of the tonsils and fauces appeared commoner when the disease was contracted while bathing, and they considered that this observation supports a transmucosal route of entry. Commenting on the well-known preponderance of infection in boys, these observers suggest the marked proclivity of males for diving, ducking, and "larking" in the water as a possible explanation. It seems to us that a greater fastidiousness on the part of girls in the choice of bathing-places may be an equally important factor. For instance, we know of a boy who developed canicola fever after bathing in a disused quarry in company with the carcass of a dead dog.

An outbreak of Weil's disease in Leningrad was thought by Viskovsky (1944) to be caused by food contaminated by rats. Vegetables grown in gardens and allotments may often be fouled by dogs, and it seemed of interest to test the possibility of transmission by uncooked greenstuff. Approximately 0.5 ml. of a virulent culture of *L. canicola* (about 5,000,000 organisms) was sprayed over lettuce leaves, which were then fed to a hamster. When the animal was sacrificed 11 days later typical haemorrhages were present in the lungs, and large numbers of leptospires were seen in microscopical preparations of the liver and kidneys. This was only one test, made on a single animal, and one cannot say that the result is applicable to man. It does indicate, however, the need to investigate the possibility more fully.

Problems of importance in public health arise with regard to the risk of transmission of canicola fever from dogs to man. In frank cases which are under the care of a veterinary surgeon advice may be given to the owners about the risk of infection and how best to counter it by disinfecting the animal's dejecta. But the large numbers of dogs which are infected without being acutely ill, and the healthy carriers, constitute potential sources of danger. We believe that canicola fever is commoner in Great Britain than the numbers of recorded cases indicate, and that it will become more frequently recognized. This has been the experience in all countries where the disease has been found and carefully studied. In Denmark, Borg-Petersen uncovered six cases during the examination of 8,000 sera sent for routine Widal tests, and Broom (unpublished) has had the same experience when testing sera from patients believed to be suffering from meningitis of viral origin.

Summary and Conclusions

Six cases of canicola fever are described.

The febrile attacks in the first two patients, a husband and wife, were thought to be due to influenza, and the true cause was not suspected until iridocyclitis developed during the later stages.

The source of infection was a puppy which was found to be a healthy carrier of *L. canicola*.

Both patients suffered from skin abrasions of the hands, and both had mopped up pools of urine left by dogs.

The patients lived in a relatively circumscribed community, and 10 of the 13 dogs belonging to the inhabitants were serologically positive to *L. canicola*.

Samples of serum from 43 other adult members of the community were negative for leptospirosis.

The source of infection of the third case could not be traced.

The fourth case had apparently contracted the disease while bathing in a stagnant river, presumably fouled with dog urine containing *L. canicola*.

The fifth patient had possibly been infected from her own dog; the sixth almost certainly from his.

In discussing these findings, attention is drawn to the occurrence of ocular and neurological manifestations in leptospirosis, and to their value in differential diagnosis.

Some comments are made on the prevalence of the infection in dogs and the potential danger of transmission to man.

The conclusion is reached that *L. canicola* has a low infectivity for man, but that dog-owners should be advised to take precautions when dealing with the dejecta of sick animals, and even of apparently healthy puppies.

We wish to record our grateful thanks to Mr. F. Clifton and Dr. J. Pendergast, who supplied us with the reports of the examination of the eyes of the first two patients, and to Dr. Kelly, who carried out the eye examinations on the other members of the camp.

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The Chelsea Hospitals Group publishes a periodical entitled the *Chelsea Hospitals Quarterly*. It is intended for people in Chelsea, and particularly for those connected with the hospital group as staff, patients, or friends. The periodical will tell them about the activities of their hospitals, and the January number includes a short history of St. Stephen's Hospital.

SYMPTOMS AND SIGNS OF EXPERIMENTALLY INDUCED VITAMIN DEFICIENCIES IN MAN*

BY

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A search of the published accounts of experiments designed to induce vitamin deficiencies in man reveals a very uneven distribution of work in relation to the individual accessory food factors. Some vitamins have been the subject of repeated investigations, others have been studied by only one or two investigators, and a few have never received any attention.

There are a number of reasons for these discrepancies. In the first place, it is clear that experiments on human subjects are scarcely justifiable if the results of animal experiment or clinical experience have already suggested that a deficiency entails the development of symptoms dangerous to life or health, or if the changes produced are irreversible. Thus, in the case of vitamin E, animal experiment suggests the possibility that degeneration in the nervous system might result from a deficiency, and it is known that an irreversible sterility is readily induced in male rats by lack of this vitamin. Hence, even supposing that the difficulty of constructing a diet adequate in vitamins A, B, C, and D and lacking in E were overcome, and even allowing for the great variation in signs of deficiency in different species, an experiment on human subjects to test the effects of severe restriction of vitamin E might be disastrous.

Secondly, there is the difficulty of constructing a diet in which only the vitamin under test is deficient. For example, pantothenic acid, as its name implies, is very widespread in foodstuffs, and to eliminate it from an acceptable diet would be almost impossible. Or, again, the diet may be admirable from the research worker's point of view but so unpalatable that even the inhabitants of a mental hospital cannot eat it.

Thirdly, the biochemistry of some of the lesser-known vitamins is so fragmentary that the problem cannot be attacked as yet. In some cases no reliable or simple method of assay of the vitamin has been discovered, so that it is difficult to state in feeding experiments what the subject's intake is, what the concentration in the plasma is, or how much he is excreting.

Fourthly, there is the vexed question of biosynthesis. It is useless to eliminate a vitamin from the diet of an experimental subject if he is capable of synthesizing the substance. It has been shown, for example, that nicotinic acid and vitamin K are synthesized in the intestinal canal by bacterial action. The same is probably true of aneurin, riboflavin, and other vitamins.

Methods of Study

With these difficulties in mind, the experimental methods employable for induction of a vitamin deficiency in man may be considered. The method used in the vast majority of experiments has been to give a diet deficient in only one vitamin and to observe the effects. As a further check on the results it is customary at the conclusion of the experiment to add the missing vitamin to the diet, when prompt disappearance of any signs and symptoms of deficiency should result. In a few cases an indirect experimental approach has been necessary. Thus Sydenstricker *et al.* (1942) claimed to produce a biotin deficiency by giving a diet containing a prodigious amount of raw egg-white, calculated to contain enough avidin to combine with and inactivate the biotin synthesized in the gut. Again, Ellinger and Shattock (1946) deliberately induced a nicotinic acid deficiency in a woman by giving penicillin orally to kill intestinal bacteria. It is, moreover, probable that as more becomes known about anti-vitamins it may be possible to provoke a vitamin deficiency in a subject on a full diet by giving the appropriate anti-vitamin. This has been suggested by Hawkins and Barsky (1948) in the case of pyridoxin, to which the appropriate anti-vitamin is desoxypyridine.

Studies on experimentally induced vitamin deficiency fall into two groups—those in which the investigator has gone as far as he dare in an attempt to produce more and more symptoms and signs, and those in which the emphasis has been on dietary restriction rather than deprivation and the main object has been to discover the amount of restriction necessary to cause minimal signs and symptoms.

Sources of Error

In both cases there are many discrepancies in the accounts published, so that the validity of some of the results must be questioned. The first difficulty is to ensure that the changes induced are due to the absence of one and only one vitamin. On this ground some of the earlier publications must be held invalid. Thus the diet used by Sebrell and Butler (1938) to demonstrate ariboflavinosis may have been deficient in other vitamins as well, and the same criticism applies to the study of vitamin-A deficiency by Hecht and Mandelbaum (1940). Moreover, deprivation of one vitamin may affect the action of others and thus bring about a multiple deficiency. For example, Bourquin (1945) noted temporary falls in the ascorbic acid level in the plasma of women who were maintained on a diet low in aneurin, and Mayer and Krehl (1948) have pointed out that rats on a diet low in vitamin A also undergo depletion of vitamin C in liver and blood. This suggests that a "pure" deficiency syndrome may be not only a clinical but also an experimental myth. In the classical "one-man" experiments, such as that of Crandon, there is of course the great disadvantage of lack of controls, but in group experiments many more sources of error may be present. The subjects may be unduly suggestible. If one complains of fatigue, the others may rapidly follow suit. Even where control subjects receiving a vitamin supplement are used and the others receive a placebo, it is important that the investigator himself should not know which members belong to the two groups, lest he unwittingly betray his knowledge.

The duration of a depletion experiment is of great importance. Thus a recent study of vitamin-A deficiency suggests that it takes more than 18 months' absolute deprivation of this vitamin to produce any clinical signs at all, and Elvehjem (1944) cites the case of a monkey on a purified but apparently adequate diet for three years before a change in environment brought out signs of nutritional deficiency.

Other sources of error will be referred to in connexion with the discussion of individual publications. It is now proposed to consider the work that has been done on experimental induction of deficiencies of individual vitamins.

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Vitamin A

The most reliable experiment in vitamin-A deprivation would seem to be that recently described in a Medical Research Council report by the Vitamin Subcommittee (Mellanby *et al.*, 1949). The results differ somewhat from those mentioned in some pioneer studies published in 1939 and 1940, but the British workers planned and conducted their investigations with such great care that one has no hesitation in accepting their conclusions in preference to those of certain German and American investigators. The main facts that emerge from the Medical Research Council study are that it is extremely difficult to produce by dietary restriction signs and symptoms of vitamin-A deficiency in previously healthy adults, and that such signs and symptoms as do appear are few and trivial.

In this experiment 16 volunteers consumed a diet practically devoid of vitamin A for periods varying with the individual up to two years, seven other subjects acting as controls. All were young adults and most were men. No symptoms that could be definitely attributed to vitamin deficiency appeared in any of the 16 at any time. Objectively the only signs found in the subjects under test and not in the controls were a deterioration in the capacity for dark-adaptation and a fall in the vitamin-A concentration in the plasma. Although night vision appeared to be grossly defective on testing in two subjects, neither was really certain that he had greater difficulty in getting about in the black-out (the experiments took place in 1942–3) than previously. The other and more dramatic symptoms and signs described by earlier workers, such as loss of weight, anaemia, and increased fatigability, were absent, and abnormalities such as follicular hyperkeratosis and degenerative changes in the conjunctiva, previously thought on clinical grounds to be associated with vitamin-A deficiency, were either absent or also present in controls.

It would seem that, as Stannus (1945) maintains, follicular hyperkeratosis has nothing to do with vitamin-A deficiency. One may note in passing that Sheard *et al.* (1944) predicted that it would take one to two years to deplete a healthy young adult of his vitamin A reserves. Symptoms complained of more by those on a vitamin-free diet than by controls were dryness of the skin and ocular discomfort, but without corresponding objective signs.

Before publication of the M.R.C. report the classical descriptions of experiments in vitamin-A deprivation were those of Wagner (1940), Hecht and Mandelbaum (1940), and Wald and Steven (1939). Wagner gave a most dramatic description of a syndrome including not only deficient dark-adaptation and changes in sensitivity to various colours but also loss in weight, anaemia, leucopenia, and thrombocytopenia, with appearance in blood films of degenerate forms of red cells and cells of the myeloid series. It must be remembered, however, that his subjects were people who had been under detention in a German penal institution and on a diet nearly devoid of vitamin A for from one year to two years previously. He studied 10 subjects whose diet was restricted for 188 days, the amounts of vitamin A and carotene consumed being negligible, and claimed prompt cure of symptoms by giving 2,000 to 2,500 i.u. of vitamin A at the end of the experiment. It is of course possible that similar changes might have appeared in the British volunteers if their deprivation had been prolonged for another year or so.

Hecht and Mandelbaum's study, on 17 individuals, was not prolonged enough to produce gross symptoms, since it lasted for only 124 days. Here again the only abnormal feature was a deterioration in dark-adaptation, which appeared in from 20 to 45 days. The only unusual finding is that this abnormality took several weeks to correct after a dose of 100,000 i.u. of vitamin A. It is possible that the diet used was deficient in other respects than in vitamin A. The work of Wald and Steven (1939) and of Wald, Brouha, and Johnson (1942) presents no unusual features, but the finding of Booher and Callison (1939) that depletion of vitamin A could be attained by dietary means in 40 days remains as yet unexplained and unconfirmed.

Lastly, it should be pointed out that experimental induction of vitamin-A deficiency, or for that matter of deficiency in any of the vitamins, might be considerably easier if the subjects were pregnant women, and easier still if they were lactating women. Practical testing of this point is of course unlikely.

The Vitamin B Complex

The three best-known members of the vitamin B complex—aneurin, riboflavin, and nicotinic acid—have received a great deal of attention in relation to human nutrition, although it has not been possible to conduct a satisfactory study of experimental human nicotinic acid deficiency, and the data available for riboflavin deprivation are confusing and somewhat contradictory. During the last war many investigations of deficiencies of these three vitamins were carried out in the U.S.A. because it was felt that they were intimately linked with muscle metabolism and therefore any dietary deficiency in them might interfere with the efficiency of the American male in the war effort.

The earliest studies were, however, pre-war ones, but as at first the chemistry of the individual members of the complex was ill understood these studies involved deficiency in the complex as a whole. Nevertheless a comparison of the symptoms produced with the symptoms later recorded as those of aneurin-lack reveals to what an extent the latter dominated the picture.

As a model of such work the findings of Elsom *et al.* (1940) may be considered in detail. They worked with a single volunteer, on whom two experiments in vitamin B deprivation were carried out, in 1933 and in 1938.

The subject was a healthy woman of 60 who in 1933 was maintained for a year on a diet probably deficient in all members of the B complex, and who was again given a diet in 1938 known to be deficient in aneurin and presumed to be inadequate as regards the other vitamin B factors. She received this diet for eight weeks to allow time for symptoms and signs to develop and was then given over successive three-week periods supplements of aneurin, aneurin plus riboflavin, and yeast. The findings are classified as follows :

1. *Cardiovascular.*—After five weeks dyspnoea and palpitation developed, together with a precordial pain not typically anginal. Tachycardia was at first paroxysmal and later continuous. Pulse rate fluctuated greatly, and a soft systolic murmur in the aortic area was occasionally heard. Aneurin administration restored the situation to normal. There were no changes in blood pressure or radiological findings, and, contrary to expectations, the electrocardiogram remained normal. Others had reported electrocardiographic changes said to be typical of aneurin deficiency, but it may be that the signs of the latter are modified in the presence of multiple deficiencies.

2. *Gastro-intestinal.*—After one week anorexia developed and this increased until there was a complete distaste for all food. Associated with this were increasing nausea and, later, vomiting. These symptoms have constantly been recorded in experiments on aneurin deprivation and have on occasion made it necessary to terminate studies. They were associated in the present case with abdominal discomfort, heartburn, and

constipation, and later with moderately severe generalized abdominal pain. Some soreness of the tongue was occasionally noted. Aneurin administration relieved the pain and anorexia, but in the latter case only temporarily. Radiologically, gastric emptying was found to be delayed and small-bowel motility decreased, but the so-called deficiency pattern in the latter was never seen.

3. *Neurological.*—The first neurological sign to develop was a diminution in electrical excitability of peripheral nerves. Signs of peripheral neuritis then appeared—hypoaesthesia and hypoalgesia, and tenderness along nerves and in muscles. These signs, particularly the muscle-soreness, have been observed frequently in studies of aneurin deficiency; they disappeared promptly on giving this vitamin.

4. *Mental.*—The subject, who before the experiment had seemed to be a sensible, well-balanced individual, complained of irritability, nervousness, depression, and apathy. Memory and capacity for concentration became impaired, and aneurin administration did not altogether cure her mental symptoms.

5. *Blood Changes.*—These were indefinite. There was a suggestion of a hyperchromic anaemia such as has elsewhere been described as part of the aneurin-deficiency syndrome, but this persisted long after the experiment ended.

6. *Miscellaneous.*—The woman complained of tiring easily. Her skin became pale and flabby, and oedema of the arms and legs became progressively greater though weight was lost. Aneurin temporarily improved these symptoms, riboflavin did not help, and only administration of whole yeast cured her. The syndrome did not greatly differ from that induced in the same subject in 1933, save that glossitis and neurological disturbances were more prominent and anaemia, mental changes, and cardiovascular manifestations less prominent in the earlier study.

To this pilot study other investigations involving induced deficiency in more than one member of the vitamin B complex have not added a great deal. The mental changes were worked out in greater detail by O'Shea and Elsom (1942) in an experiment involving three elderly women and four controls. Foresight and judgment were shown to be definitely impaired, and were only partially improved by aneurin administration. Guetzkow and Brozek (1946) showed that, whereas a restriction of B complex in young men for over five months caused no intellectual deterioration, a further *total* deprivation for three weeks interfered with those mental functions in which speed plays a part.

The question of physical fitness in relation to deprivation of the vitamin B complex has been investigated in young men by Egaña *et al.* (1942), who produced undue fatigue and loss of efficiency in seven healthy doctors in three to four weeks (but no other symptoms), and by Johnson *et al.* (1942), who found that physical fitness deteriorated most if aneurin was withdrawn from the diet, in which case deterioration was associated with muscle and joint pains. Johnson's results have, however, been severely criticized by Keys *et al.* (1944), who state, as a result of short-term experiments on eight volunteers, that young men do not undergo physical deterioration rapidly when placed on a diet deficient in vitamin B complex. This latter paper gives evidence of careful work and must command respect, although Johnson in a reply points out the considerable difference in conditions between the two experiments. Keys (1945) later published results of a very cleverly designed experiment in which volunteers, after 161 days on a diet restricted in aneurin, riboflavin, and nicotinic acid which produced no significant results, took a diet almost devoid of vitamin B complex for 33 days. An elaborate system of cross-controls showed that aneurin was the important factor in producing anorexia, nausea, loss of endurance and physical fitness, as well as apathy and depression.

Aneurin

The earliest studies in which only aneurin deficiency was induced were those of Jolliffe *et al.* (1939) and Williams *et al.* (1939). Jolliffe used five normal volunteers and induced symptoms within four days, afterwards abolishing them within three to six days by giving an aneurin supplement. The only constant symptom was fatigue. Other symptoms included anorexia, dyspnoea on slight exertion, precordial pain, burning feet, and muscle cramps. Hyperaesthesia of the feet developed in four subjects and tenderness of the calves in one. In Lead III of the electrocardiogram an inverted T-wave was observed in two volunteers. Williams *et al.* gave four young women a diet containing less than 0.1 mg. of aneurin daily and found that symptoms appeared at a much later date, taking four to five weeks to develop. In addition to those features mentioned by Jolliffe, they observed constipation and achlorhydria and noted changes in the T-wave in Lead IV F of the electrocardiogram. Symptoms and signs disappeared within 12 days when 4 mg. of aneurin was given parenterally. In a second study Williams *et al.* (1940) extended their observations and improved on their experimental diet. They stress the point that withdrawal of aneurin alone from the diet does not produce beriberi. Neither oedema nor severe neuritis was ever seen, nor was cardiac dilatation ever detected. Radiologically the slow gastric emptying and sluggish intestinal motility mentioned in Elsom's experiment were observed. The experiment was prolonged up to 111 days and a state of extreme debility resembling neurasthenia was produced.

In a third experiment Williams *et al.* (1942) gave 11 women a diet less restricted in aneurin than in previous studies; they again emphasize the state of emotional instability and impaired physical efficiency previously noted. Holt (1944) has criticized these publications of Williams *et al.*, and thinks that they lay too much stress on neurasthenic symptoms, which have been observed in other experiments in which aneurin deficiency could not possibly play a part. Holt quite rightly mentions the fact that in the Netherlands Indies, where beriberi is rife, Dutch physicians are constantly on the look-out for signs of vitamin-B deficiency and yet know nothing of the syndrome of so-called "subclinical aneurin deficiency." Najjar and Holt (1940) produced no symptoms in subjects deprived of aneurin for 40 days. Other experiments on aneurin deficiency, such as those of Wang and Yudkin (1940), Archdeacon and Murlin (1944), Foltz *et al.* (1944), and Daum *et al.* (1948), have not added anything of significance to the basic picture described above.

Riboflavin

With this vitamin we are on much more controversial ground than with aneurin. The classical papers on experimentally induced ariboflavinosis are those of Sebrell and Butler (1938, 1939), but some doubt has been cast on their work. The diet given to their experimental subjects—18 women—was thought to be deficient only in riboflavin, but it may have been also deficient in other members of the B complex, such as pyridoxin, which has been said to heal the lesions of so-called ariboflavinosis. Be that as it may, 10 out of the 18 women developed a cheilosis after 94 to 130 days on the deficient diet. The first sign was a pallor of the lip mucosa near the angles of the mouth. Lesions became macerated and then fissured, the fissures occurring symmetrically at the angles of the mouth and extending somewhat downward. The lesions were moist and covered with a superficial crust, and sometimes extended on to the

skin. Along the line of closure there was loss of superficial lip mucosa. In addition a fine greasy desquamation on a mildly erythematous base was seen in the naso-labial folds, on the alae nasi, in the nasal vestibule, and on the ears. Lesions responded to synthetic crystalline riboflavin and not to nicotinic acid, and are therefore considered to be due to lack of the former; but the evidence is not entirely convincing, since lesions did not always disappear with dramatic suddenness.

Of the women who did not develop cheilosis, four received riboflavin supplements after the 139th day and no symptoms developed by the 365th day, while cheilosis developed in three of the other four who continued with the experimental diet. It is interesting to speculate on the reason for the comparative "resistance" of some of the women to riboflavin depletion, since all were inmates of a mental hospital and had presumably subsisted on a fairly standard diet before the experiment. Possibly the lesions were not entirely due to lack of riboflavin; there is, however, the possibility of biosynthesis of the vitamin, as suggested by Najjar *et al.* (1944) in a study of 12 adolescent boys given for three months a diet deficient only in riboflavin. They remained in excellent health, and the amount of riboflavin excreted in the urine rose after a preliminary fall to ten times the amount ingested.

When four subjects received a diet restricted in riboflavin alone to an amount approximating to half the suggested daily requirement, no signs of deficiency appeared during a period of 288 days, according to Williams *et al.* (1943).

It has been suggested that riboflavin deficiency is associated with ocular lesions such as corneal vascularization, but direct experimental proof of this is lacking. Thus when Boehrer *et al.* (1943) gave three individuals a diet deficient in riboflavin the only evidence of corneal vascularization was found in a control subject, and this did not respond to a large daily riboflavin supplement. Keys and his colleagues (1944) published an impressive paper on the effects of riboflavin restriction on six normal young men. These men probably received about twice as much riboflavin daily as did the patients studied by Sebrell and Butler. Although the experimental period amounted to 152 days in three instances, not the slightest clinical evidence of a deficiency was obtained. Lastly, it should be noted that Machella and McDonald (1943) have strongly challenged the statement that riboflavin deprivation leads to cheilosis. To sum up, the burden of proof must still rest on those who support the contentions of Sebrell and Butler.

Nicotinic Acid

Nobody has as yet given a direct demonstration of clinical effects caused by withholding nicotinic acid *alone* from a dietary. There are two points for consideration here. First, a great body of evidence points to the occurrence of synthesis of this vitamin on an appreciable scale in the intestine. Secondly, although Goldberger and Wheeler (1915) produced classical pellagra by dietary restriction nearly 30 years ago, it is still by no means certain that this disease always appears as a result of severe nicotinic acid deficiency. For example, Briggs *et al.* (1945) admitted to hospital two patients who still had mild lesions of an old pellagra and gave them a diet containing only 3 mg. of nicotinic acid daily, for 42 and 9 weeks respectively. No change occurred in the severity of the lesions.

Reference has already been made to the induction of what seems to have been a nicotinic acid deficiency by the indirect method of sterilizing the interior of the intestine and so killing the bacteria responsible for nicotinic acid synthesis. Thus Hardwick (1946) records the development of stomatitis and acute dermatitis with ulceration at the angles of the mouth in a woman given sulphaguanidine, and cure of the lesions by nicotinic acid. Ellinger and Shattock (1946) gave penicillin orally to a woman, with the intention of producing deficiencies, and observed the appearance of dark-brown patches on the tongue within a few days. In addition the patient complained of malaise, lassitude, difficulty in concentration, slight physical incoordination, and a redness of the feet. Nicotinic acid cured her promptly. The trap in these experiments is of course that antibiotics or sulphonamides may interfere with biosyntheses of other vitamins.

Biotin

Here again indirect means must be used to induce a vitamin deficiency experimentally. The only study available is that of Sydenstricker *et al.* (1942), who attacked the problem by giving to four volunteers the raw white of 80 eggs a day, so as to render unavailable the biotin in the diet and synthesized in the gut. Obviously this freak diet bears no relation to everyday life and the experiment is purely of academic interest. After three to four weeks a greyish pallor of the skin was observed; this was unrelated to the blood picture. Later the skin became dry and desquamated, and the lingual papillae became atrophic, while general symptoms resembling those of aneurin deficiency appeared. Injection of a small amount of biotin sufficed to restore the patient to normal. Other observers have not as yet recorded a similar experiment.

Pyridoxin

Hawkins and Barsky (1948) attempted to induce a pyridoxin deficiency in one of them (Hawkins) by taking a purified diet with addition of all the necessary known vitamins except pyridoxin for 54 days, after which he received a supplement of 10 mg. of pyridoxin daily for seven days. Findings during the period of deprivation were indefinite, but lack of the vitamin may have been related to the development of albuminuria (though Hawkins had an old history of renal colic), to some depression and mental confusion which disappeared on adding pyridoxin to the diet, and to a lymphocytosis which also disappeared with resumption of a normal diet.

Vitamin C

The first work on experimentally induced vitamin-C deficiency in man was done in Germany in 1939, and was soon followed by an important paper published by Crandon and his associates (1940). Although several carefully conducted experiments have been carried out since, little has been added to the clinical picture described by the pioneer workers.

The first work was done by Rietschel and Mensching (1939) in Würzburg. Mensching subsisted for 100 days on a diet thought to be free from vitamin C, all food containing this substance being thoroughly cooked with soda to destroy the vitamin. No signs or symptoms appeared, and the only reason for discontinuing the experiment was that Mensching doubted his ability to keep to the diet when he went home for Christmas. In a second paper Rietschel and Schick (1939) described an attempt by Schick to induce signs of deficiency in himself during a 160-day period on the diet used by Mensching. Again no signs of deficiency appeared, although Schick undertook a strenuous ski-ing expedition during the experiment. A few hypertrophied red papillae appeared on the gums, but these were ascribed to the effect of recent dental fillings. It is of interest that a previously troublesome bronchitis cleared up during the experiment.

In 1940 an American observer (Crandon) at last succeeded in inducing signs and symptoms of vitamin-C deficiency in himself (Crandon *et al.*, 1940). He showed that Rietschel's colleagues had discontinued their experiments too soon, since in his case there were no physical findings for the first four months. Crandon put himself for six months on a diet free from vitamin C but supplemented by all the other known dietary constituents. In the later stages of the experiment Crandon lost weight, but this may have been due to the type of diet rather than to a vitamin deficiency, since giving vitamin C did not result in increase in weight. Like Schick, he found that he was remarkably free from respiratory infection, to which he had been subject in other winters.

The first definite signs presumably due to vitamin-C deficiency appeared in the skin after 134 days on the diet. They took the form of small perifollicular hyperkeratotic papules on the buttocks and calves. Each papule contained an ingrowing hair, and the hairs tended to become fragmented. The skin, particularly on the extensor surfaces of the limbs, became dry, and the backs of the hands became rough. After 161 days small perifollicular haemorrhages or petechiae appeared on the legs below the knees, and were more numerous after prolonged standing. The relation of the skin lesions to vitamin-C deficiency was confirmed by their disappearance on giving the vitamin.

Contrary to expectations, the gums and teeth remained practically normal, apart from a little bogginess. Biopsy specimens revealed normal structure. Radiographs of teeth showed occasional interruption of the lamina dura. It would seem that the gum changes in classical scurvy are due to an infective factor in addition to a vitamin deficiency.

The subject first observed fatigue and weakness after three months, and this was progressive. Capacity for walking and running, for instance, was particularly impaired. Within 24 hours of receiving a dose of vitamin C lassitude was said to be less. The healing of wounds was investigated. Although after three months it appeared to be normal, there were definite signs of deficient healing in the depths of a wound surgically inflicted after 182 days. In 1940, Fox *et al.* published the results of a study on native mine-workers which serves as a corollary to Crandon's experiments. Their investigation was based on the opposite principle to that of Crandon. They found a community of individuals who were existing on a diet probably deficient in vitamin C, and separated them into two groups, to one of which they gave a daily supplement of 40 mg. of ascorbic acid. Apart from an increased incidence of scurvy in the group not receiving a supplement, no differences were detected between the two groups after seven months. As it is admitted that the exact intake of vitamin C in the two groups, and therefore presumably the intake of other vitamins, was not known, the investigation is of limited value.

Pijoan and Lozner (1944) conducted an experiment on six volunteers, who after a short period of saturation with vitamin C received a diet free from this vitamin until symptoms appeared. Results were very similar to those of Crandon, for no symptoms appeared for five to six months. The first signs of impending scurvy were lassitude, fatigue, and irritability, and two weeks later petechial and perifollicular haemorrhages appeared. Only one subject had gingival bleeding.

Johnson *et al.* (1945) confirmed the maintenance of physical efficiency in the early weeks of deprivation of vitamin C in a study of 24 volunteers who received a diet devoid of vitamin C for eight weeks. Farmer's (1944) findings in an experiment involving 12 young men did not differ greatly from those of Crandon. He stresses, however, a marked tendency to infection of experimental wounds as well as the previously observed slowness of healing. His subjects also underwent psychological tests, and it was found that the choice reaction time increased after the third to fifth months on a deficient diet. There was also loss of interest and of motivation. Characteristics such as aggressiveness or submissiveness became exaggerated.

The latest investigation to be published is that arranged by the Vitamin Subcommittee of the Medical Research Council (Peters *et al.*, 1948). The main points in Crandon's experiment were confirmed in a very carefully arranged and controlled study on 19 young men and women which continued for over a year. The observers agree with Crandon that the first sign of a deficiency is enlargement and keratosis of hair follicles, but do not think that the skin changes are pathognomonic of vitamin-C deficiency. This first appeared after 17 weeks and was present in all test subjects by the end of the sixth month. Follicles were plugged with a horny material in which a hair lay coiled. The main areas affected were the upper arms, back, buttocks, backs of thighs, calves, and shins. After a few weeks the follicles became red and, later, haemorrhagic. An acne present in five subjects at the beginning of the experiment became worse.

Gum changes appeared after six months in the form of tiny interdental haemorrhages with swelling. In two cases gingivitis became really severe and necrosis and gross bleeding occurred, but the volunteers had had some gum disease before the experiment. There was evidence of increased fatigue, but in contrast to the findings of earlier workers no psychological changes were observed. The fact that no weight was lost must be attributed to the more careful choice of diet. The observers do not confirm Farmer's findings of an increased tendency to wound infection, and emphasize that wound healing was delayed only after scurvy had developed. The dryness of skin mentioned by Crandon was not seen. The volunteers did not complain of weakness.

A curious feature is the occurrence of anginal attacks in two volunteers with some electrocardiographic evidence of heart-block.

Other Vitamins

The above are the only vitamins deficiency of which has so far been induced experimentally in man. In the case of the lesser-known members of the B complex, such as pantothenic acid, folic acid, *p*-aminobenzoic acid, choline, and inositol, and of vitamins D, E, K, and P, either insufficient is known to plan an experiment or the attendant risks are thought to be too great.

Summary

The symptoms and signs of experimentally induced deficiency of vitamins A and C and of aneurin, riboflavin, nicotinic acid, biotin, and pyridoxin are discussed.

Vitamin A deficiency is difficult to induce in healthy adults, and the signs and symptoms are trivial.

The most striking features of experimentally induced aneurin deficiency are fatigue, anorexia associated with nausea and vomiting, peripheral neuritis, mental changes, and cardiovascular changes. Riboflavin deficiency may lead to cheilosis, but this is not certain. The exact results of nicotinic acid deficiency are not yet known. Biotin deficiency may lead to a dermatitis with pallor of the skin. Pyridoxin deficiency may be associated with albuminuria, mental changes, and lymphocytosis.

Experimental induction of vitamin-C deficiency leads after an interval of several months to perifollicular hyperkeratosis and later to petechial and perifollicular skin haemorrhages. Gum changes are slight.

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The *Danish Foreign Office Journal* (No. 3, 1949) contains an illustrated account of recently invented Danish scientific apparatus. The country that gave the world the Finsen lamp has raised the construction and design of these lamps to an extremely high standard. A new haemometer gives a direct reading on an electrically controlled scale of the haemoglobin in any sample of blood which is compared with a standard colour in an illuminated observation window. The lighting is adjusted until the tints of the two are identical. A new audiometer, with a frequency range of 20 to 20,000 kilocycles, has a built-in microphone and masking oscillator, and two insulated loud-speakers mounted on an adjustable stand. A new all-purpose electric water-bath, heated by an infra-red lamp, can be raised to a temperature of 400° C.

DISABILITY PRODUCED BY EXPOSURE OF SKIN TO MUSTARD-GAS VAPOUR

BY

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For a period after the introduction of mustard gas (2,2′-dichlorodiethyl sulphide) in the 1914–18 war "casualties" were produced as a result of ocular and respiratory lesions. Later, when adequate measures were taken to protect the eyes and respiratory tract, the skin burns came into increasing prominence as a cause of disability. The introduction of effective respirators and good gas discipline also had a considerable effect in reducing the incidence of disabling systemic poisoning.

In the interval between the wars the disability produced by the action of mustard gas on human volunteers was studied by various workers, and these investigations were intensified during the 1939–45 war, particularly with respect to tropical conditions. There was, however, no generally accepted classification of this disability, and, further, in most cases no practical test was applied to its assessment, which therefore depended solely upon the personal opinion of the investigator. In 1944 a system for the practical evaluation of disability in terms of the results of standard physical performance tests was evolved in Australia by Ennor, Gorrill, Legge, and Sinclair. In an attempt to evaluate the factors concerned in the production of disability in the field a modification of this system* has been applied to the analysis of disability in men exposed to mustard-gas vapour in the Tropics.

Material and Methods

Over a period of two years 179 men were under observation following exposure to various dosages of mustard-gas vapour under tropical conditions. All the subjects wore fully effective respirators throughout exposure; 147 wore ordinary tropical Australian battle-dress and 32 wore additional clothing which denied access of mustard vapour to the genitalia and buttocks.

On each day after exposure a standard physical performance test was carried out, consisting of two runs over a specially constructed assault course and a six-mile (9.6-km.) march in full equipment. In certain cases the capacity of the subject to defend himself by firing an automatic weapon was assessed On the basis of his performance in these tests every man was placed each day in one or other of five categories. Table I sets out these

TABLE I.—*Classification of Disability*

Category	Criteria for Inclusion
1. Unaffected	No objective sign of exposure
2. Injured, without disability	Performance test satisfactory; no treatment required
3. Injured, requiring treatment	Performance test satisfactory; treatment required
4. Partially disabled	Failure on any part of performance test
5. Totally disabled	Failure on any part of performance test, plus inability to use any weapon in self-defence by reason of: severe burns of the hands, loss of vision, gross systemic intoxication, or pain requiring morphine

categories, together with the criteria for inclusion in each. (The subsequent use of the terms "disability," "disabled," etc., without qualification, should be taken to refer to categories 4 and 5 of Table I taken together.) So long as

*The Ministry of Supply wishes me to make it clear that this system has not been officially accepted by the Medical Directorates of the British Armed Forces.

disabled men retained the capacity to fire a weapon effectively they continued to be classed as "partially disabled" even when they were sent to hospital on account of their injuries. The justification of this procedure is that from a military standpoint such men, whom it might not always be possible to evacuate, could be of considerable value to the defence of a fixed position. All disabled men were encouraged to remain ambulant for as long as possible, even though they were unable to complete the daily performance test.

Men with lesions of apparently identical severity were often classified in different groups as a result of differences in morale. No attempt was made, however, to modify the findings on clinical grounds, since it was considered that this factor would be equally operative in the event of chemical warfare breaking out. Though the stimulus of battle conditions was lacking, it was to some extent compensated for by the presence of a strong competitive spirit among the volunteers. Indeed, the whole-hearted co-operation of these men cannot be adequately acknowledged.

The system of assessment described above takes account of the fact that variations in the degree of disability may occur from day to day and also makes it possible to record the *actual* time of incapacitation instead of making an estimate.

Detailed daily records of the clinical condition of the volunteers were also kept (Sinclair, 1949b), and prognostic indications in respect of disablement were derived from them. An attempt to ascertain some of the factors responsible for the production of disability was made by asking each disabled man the reason for his failure to complete the performance test. This interrogation was carried out daily in conjunction with the routine clinical examination, and in every case it was found possible to attribute the disability to one or more specific causes.

It is convenient to classify the disabled subjects in terms of their maximum disability at any time after exposure; Table II shows the result of such a procedure. In 45 men there was some degree of interference with military performance.

TABLE II.—*Incidence of Disability*

Maximum Disability	Skin Protection		Total
	None	Partial	
Totally disabled	1	1	2
Partially disabled	34	9	43
Injured, requiring treatment	24	—	24
Injured, without disability	84	19	103
Unaffected	4	3	7
Total	147	32	179

The subjects are classified according to the maximum disability occasioned them at any time after exposure.

Cause of Disability

Since respirators were worn by all subjects, skin burns (Sinclair, 1949b) and systemic poisoning (Sinclair, 1948) constituted the only means by which disability could be produced. Table III shows the various causes and the number of men who attributed the whole or part of their disability to them. It will be seen that the aetiology is very different in the two groups of volunteers, and these differences may be correlated with the protection afforded to the skin.

Unprotected Group

In this group by far the greater part of the disability was attributed to burns of individual regions of skin, and systemic poisoning was mentioned by only one man as contributing to his condition. A study of the individual regions of the body incriminated leads to the conclusion that in unprotected men burns of a few special areas—the scrotum, penis, axillae, and buttocks—become severe enough to produce disability at dosages which are not sufficient to give rise to incapacitating systemic poisoning. In other words, *at low dosages* most of the disability produced in unprotected men will be due to skin burns.

TABLE III.—*Aetiology of Disability*

Cause of Disability	Skin Protection		Total
	None	Partial	
Burns of scrotum	33	—	33
,, ,, penis	11	—	11
,, ,, axillae	5	5	10
,, ,, buttocks	1	—	1
,, ,, other regions	—	1	1
Generalized burns	1	5	6
Systemic intoxication	1	4	5

The figures indicate the number of men in each group who mentioned the items listed as being wholly or in part the cause of their disability.

It follows that the development of disability should, in this group, be expected to run parallel with the development of the skin burns—that is, it should be delayed for several days (Sinclair, 1949b). This statement is borne out by a consideration of the number of men disabled on any given day after exposure. It was found that 50% of the eventual group disability was manifest by the fifth day after exposure, that the 90% level was attained by the ninth day after exposure, and that the maximum occurred on the eleventh day. It is interesting to correlate this finding with the fact that the eleventh day was also the day on which the maximum number of regional raw surfaces were present (Sinclair, 1949b), and to note that in only three of the 56 regional burns incriminated in Table III were raw surfaces not present at some stage in the case history.

It may also be mentioned that several of the men in the unprotected group were disabled initially by a burn of the scrotum, lesions of which tend to develop early, and that by the time this cause had ceased to operate they suffered a prolongation of disability due to deterioration of the condition of the penis (Sinclair, 1949b). Further, most of the men passed through several different classes of disability during the period of assessment. For example, the man who became "totally disabled" was classed in this category for 20 days, and spent a further 20 days classified as "partially disabled." The 34 men who became "partially disabled" spent an average of 15.7 days in this category and an additional 5.0 days classed as "injured, requiring treatment."

Partially Protected Group

In this group the picture of disability is quite different. Since the genitalia and buttocks were completely protected there is no mention of these regions, which were responsible for a great part of the disability in the unprotected group. On the other hand, it is interesting that burns of the axillae, which was the region third on the list of the unprotected group, were incriminated in five cases. These cases were all exposed to dosages similar to those administered to the unprotected group, but a further five men became disabled after being exposed to a considerably higher dosage, the cause being generalized burns in one case and generalized burns plus systemic intoxication in the remaining four. The conclusion may be drawn that as the dosage is increased not only do the burns in many regions of the body attain disability-producing status, but incapacity from systemic intoxication, due to the greater amount of mustard derivatives absorbed from the skin, becomes much more important.

There is of course no doubt that if the genitalia had not been protected a major factor in the production of disability in these men would have been the condition of the scrotum and penis, if only because lesions of these organs are slow to heal compared with the rest of the body (Sinclair, 1949b). Nevertheless, even if this had been the case systemic poisoning would still have played a leading part in their incapacitation. Potentially disabling systemic symptoms are at their height on the day after exposure, and it therefore follows that the time of onset and the development of disability in this group should be quite different from the results obtained in the unprotected group. In fact, it was found that all those in whom systemic poisoning was an operative factor became disabled within 24 hours of exposure, and that by the time the systemic symptoms had subsided the skin burns had developed enough to make the period of disability due to the two causes a continuous one. It should also be noted that severe burns seem to become manifest rather more quickly than more moderate burns. In consequence, both the subjects classified as "totally disabled" (Table II) became so on the day after exposure. Total disability in the first subject was due to severe genital burns requiring morphine, and in the second to severe systemic poisoning and generalized burns.

Admission to Hospital

Table IV gives some details regarding admission to hospital. The figures emphasize again the effect of the different aetiology of incapacity in the two groups. The severe

TABLE IV.—*Admission to Hospital*

	Skin Protection			
	None		Partial	
	Partially Disabled	Totally Disabled	Partially Disabled	Totally Disabled
Total No. of cases	34	1	9	1
No. admitted to hospital	19	1	2	1
Mean time of admission (days after exposure)	7·7	1	4·0	1
Mean duration of stay in hospital (days)	15·6	32	8·0	12

burns of the genitalia which occurred in the unprotected group were responsible for the high proportion of disabled cases requiring admission to hospital in that group, as well as for the relatively long time which they spent there. In the partially protected group the corresponding figures are much smaller, owing to the shorter course of burns of regions other than the genitalia (Sinclair, 1949b) and also to the relatively rapid disappearance of the systemic symptoms which were responsible for a proportion of the disability in this group.

Prognosis

Men protected only by respirators can be disabled within a few hours as a result of systemic poisoning if the effective dosage is high enough. In all such cases severe burns will develop rapidly, and the factor of surgical shock may also come into play. For these reasons the severity of the injuries quickly becomes apparent and there is little difficulty in arriving at a prognosis

In the lower range of dosages, however, it has been seen that the onset of disability may be considerably delayed, and it is in cases exposed to such dosages that the value of an early and accurate prognosis will be greatest. An attempt was therefore made to correlate the subsequent disability of the volunteers with their clinical condition during the first 48 hours after exposure Two main factors were considered—the presence of symptoms of systemic poisoning and the condition of the skin. The first was analysed in relation to both groups of men, while the second was used only in the unprotected group.

A total of nine men vomited within 24 hours of exposure, and all of these subsequently became disabled on account of skin burns. Twenty-nine became nauseated within 24 hours of exposure, and it was found that 83% of these eventually became disabled, while a further 10% required treatment. It must be noted that these indications are valuable only in a positive sense, since many men who did not vomit or become nauseated at any time became disabled subsequently. The occurrence of other symptoms of systemic poisoning—e.g., headache—was found to be of no prognostic significance.

In the group protected only by respirators, 11 men developed erythema within four hours of exposure. All these later required treatment, and 64% of them became disabled. Owing to the fact that most of the disability in this group was due to lesions of the scrotum, penis, axillae, and buttocks, particular attention was paid to the early development of burns in these regions. Table V

TABLE V.—*Prognostic Table, Based on Condition of Skin*

Condition of Scrotum, Penis, Axillae, and Buttocks Within 48 Hours of Exposure	Chance of Requiring Treatment	Chance of Becoming Disabled	If Disabled, Probable Duration of Disability
No damage visible	Nil	Nil	
Any damage less than general erythema in all four areas	3 to 2 against	4 to 1 against	1 to 2 weeks
Erythema in all four areas, with subcutaneous oedema in one or more	Over 10 to 1 on*	2 to 1 on*	2 to 4 weeks

* If the scrotum is one of the areas oedematous, these odds are substantially increased.

gives a summary of the prognostic indications obtained in this way, and it will be noted that the condition of the scrotum is the most important single factor.

In the group with no skin protection there was an almost exactly 10-to-1 chance that oedema in any region would be followed later by either desquamation or vesication. It could thus often be inferred, some days ahead, that a given area would require treatment later.

Several factors complicate the formulation of a prognosis. The characteristic irregularity in the development of vapour burns, even on the two sides of the same man, renders prognosis in the later stages of development of the skin burns extremely difficult. The effect of treatment must also be considered, particularly the striking results obtained in the prevention of disability by the use of elastic suspensory bandages for burns of the scrotum (Sinclair, 1949a). Again, the toxaemia of severe sepsis might be a potent disabling agent. This factor could not be evaluated, since very few lesions in this series became infected.

Discussion

Though all the findings in this paper properly apply only to volunteers exposed to mustard vapour under tropical conditions, there seems to be no prima facie reason why similar considerations should not be applied to troops exposed in temperate climates.

The necessity for an objective method of assessing disability in an investigation of this type has already been stressed, and it is submitted that the procedure adopted, however imperfect, does represent a step in that direction. By its use the term "disability" can be accurately defined and graded in a manner which bears some relation to the requirements of military situations. Further, the

employment of a daily performance test makes available a considerable amount of information on the manner of development of disability, as well as on its causes and duration.

The respective parts played by skin burns and systemic poisoning in the development of disability has already been pointed out, and it has been suggested that with high dosages subjects protected only by respirators would rapidly become disabled by a combination of systemic intoxication, generalized burns, and surgical shock. With moderate dosages, however, skin burns play the major part in the production of disability in such men, and the most important areas of skin in this respect are the genitalia and the axillae. Owing to the delay in the full development of burns in these areas there was in this series a corresponding lag in the development of disability, the overall group disability not becoming maximal until the eleventh day after exposure. Because of this delay, the ability to formulate an early and accurate prognosis becomes of considerable importance. It has been pointed out that in unprotected men it seems to be possible to make such a prognosis from the skin condition in the first 48 hours after exposure. A rough prognosis may also be based, irrespective of the skin protection afforded, on the occurrence of nausea and vomiting within 24 hours of exposure.

The possible prevention or reduction of disability is naturally a most important aspect of the subject. With moderate dosages it seems unnecessary to protect the whole body, and the prime object of any defensive measure designed to prevent disability should be the safeguarding of the genitalia and axillae. The provision of effective protection for the genital area and the buttocks would itself reduce the incidence of disability to a very large extent. It has also been remarked that the treatment of scrotal lesions with suspensory bandages has a considerable effect in reducing the incidence of disability due to burns in this region.

Summary

An account is given of the factors responsible for the production of disability in a series of 179 men exposed to the vapour of mustard gas in the Tropics.

The influence of dosage on the type of disability produced is discussed, and the importance of protecting the genitalia is stressed.

It seems to be possible to formulate a reasonably accurate prognosis on the basis of the skin condition within 48 hours of exposure. The occurrence of nausea and vomiting within 24 hours is also of value in this respect.

The kindness of the Australian Chemical Defence Board in permitting publication of the work carried out under its direction is gratefully acknowledged. Permission to publish has also been received from the Chief Scientist, Ministry of Supply. The work of assessing and recording the disability which is the subject of this paper was done by a team, to the other members of which my grateful thanks are due, in particular to Dr. F. S. Gorrill, Dr. A. H. Ennor, and Mr. J. W. Legge.

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A new unit, the Radiological Health Branch, has been formed in the United States Public Health Service to investigate and advise on risks to health due to the increased use of radioactive materials. It is under the direction of Dr. Edwin G. Williams. The unit will develop a training programme for public health workers and collect information on possible dangers to health from radioactive isotopes, *x*-ray apparatus, cyclotrons, betatrons, and other atomic-particle accelerators.

POSITION OF THE APEX BEAT AS A CLINICAL SIGN

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Previous Standards

Palpation of the apex beat is one of the commonest physical signs to be elicited, yet reference to various authorities reveals considerable divergence of opinion regarding its normal limits. There is no agreement even upon the three most important criteria concerning its definition and position—namely, (1) the point of cardiac pulsation to be regarded as the apex beat; (2) whether the limit of normal should be taken in relation to an anatomical landmark; and (3) the distance from the midline to be taken as the limit of normal where direct measurement is used.

Price (1927) gives one of the most useful definitions, "as that part of the area of pulsation, distinctly palpable, which is lowest and farthest to the left." This is supported by Lewis (1946), who describes an area 1 in. (2.5 cm.) in diameter, the outermost limit of which "is the best clinical guide to the heart's size," provided that there is no displacement. Bramwell and King (1942), although regarding this as the theoretical limit of the left border of the heart, for practical purposes prefer to take the centre of the area of maximal impulse. A third view is expressed by Carlisle (1934), who states that "the apex beat is not the point of maximum impulse, but is at the point farthest down and farthest out that the beat of the left ventricle is felt."

There is similar lack of unanimity regarding the anatomical point within which the apex beat should lie. Bramwell and King, since they consider that the size of the chest is one of the chief causes of variation in position of the normal apex beat, bound it within the mid-clavicular line. Parkinson (1936), however, holds that the mid-clavicular line is difficult to apply, especially in women. The nipple line is strongly advocated in men by various authorities, Parkinson regarding it as fairly constant and an "indispensable guide"; Noble Chamberlain (1947) states that the normal cardiac thrust is "almost invariably within the nipple line." These views are supported by Lovatt Evans (1945), Price (1927), and Carlisle (1934). However, Grassmann (1921) firmly denies the value of the mammillary line in determination of the size of the heart.

A fixed anatomical line is not upheld as more than a rough guide by Campbell and Conybeare (1942), who state that the apex beat should always be given as a distance from the midline. It must be emphasized, however, that there is a wide variation in the outermost distance from the mid-sternal line which is regarded as normal. Thus Gray's *Anatomy* (1946) states that as a general rule it will be found 3½ in. (8.9 cm.) from the midline; Noble Chamberlain gives it as up to 4 in. (10.1 cm.), while pointing out that where an abnormal apex beat is found the chest structure must be examined for scoliosis, etc., to exclude cardiac displacement. Lewis put 3–4 in. (7.6–10.1 cm.) as the usual limits of normal, and goes on to say that "a well-defined maximal impulse, the outer border of which is situated 4½ in.

(11.4 cm.) or more to the left of the mid-sternal line . . . in an adult male is to be taken as a definite sign of the heart's enlargement in the absence of cardiac displacement." Conybeare (1942), however, includes 4½ in. as within the normal range.

Some attention is also paid to the intercostal space in which the apex beat is found. Thus Noble Chamberlain maintains that where the impulse lies in the sixth or seventh space left ventricular enlargement is indicated. Other writers, on the contrary, regard an apex beat in the sixth space, at least, as a normal variation, especially in the aged.

"To locate accurately the apex beat is the most important step in the entire examination . . . in palpation of the heart" (Carlisle, 1934). Despite this importance it is evident, with such wide disagreement on the definition and standards of normality of a basic physical sign, that considerable confusion is likely to arise in the clinical estimation of the heart's size.

Procedure

A series of young men who presented themselves for routine Army medical examinations were examined for the position of the apex beat. These men had all been examined on at least two previous occasions and pronounced fit for military service; over 95% were in category A1, and those in a lower grade were so classified for reasons other than cardiovascular or respiratory disease.

Our aim was to determine accurately the limits within which the apex beat of a normal heart may lie, and an attempt was made to correlate this position with the structure of the thorax. Those cases in which the apex beat was over 4 in. to the left of the midline were compared with the remainder of the series.

The apex beat was defined as follows: (1) The point farthest out and lowest down at which the finger was distinctly raised by the cardiac impulse. (2) In those cases in which the finger was not raised and/or in which there was much diffusion of the impulse, that point was taken farthest out and down at which a distinctly localized maximal impulse was felt. The apex beat was regarded as impalpable and not measured in those cases in which it was too diffuse and no localized maximal pulsation was found.

The cardiovascular and respiratory systems were examined clinically and were in all cases normal. *X*-ray examination was not employed as a routine.

In assessing the structure of the chest, the girth was measured in mid-expiration at the level of the nipples. Any scoliosis and/or kyphosis were noted; as an additional aid in detecting spinal curvature which was not obvious from inspection of the vertebral spines a comparison was made of the height of the shoulders.

Results

The present series consists of 500 unselected subjects: each of us, independently, examined 250 cases. The age distribution of the men is shown in Table I. The average age was 21.5 years and the maximal variation was from 17 to 42 years. In 105 (21%) of the 500 cases the apex beat was not felt or was not sufficiently localized according to the definition. Of the 395 palpable cases the apex beat was found to be over 4 in. from the midline in 45 (11.4% of the total palpable). The ages of the 45 are shown in Table II.

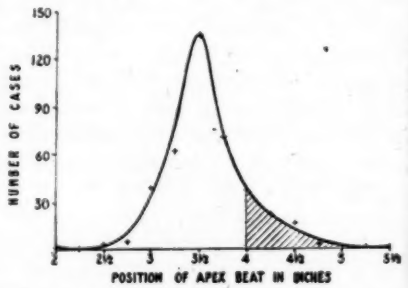
TABLE I.—*Age Distribution of Total Series*

Age	No.	%	Age	No.	%
17	1	0·2	30	2	0·4
18	8	1·6	31	0	0
19	89	17·8	32	2	0·4
20	213	42·6	33	5	1·0
21	59	11·8	34	1	0·2
22	26	5·2	35	3	0·6
23	20	4·0	36	2	0·4
24	20	4·0	37	3	0·6
25	9	1·8	38	0	0
26	19	3·8	39	4	0·8
27	3	0·6	40	2	0·4
28	6	1·2	41	0	0
29	1	0·2	42	2	0·4

TABLE II.—*Age Distribution of Those with Apex Beat Over 4 in. from Midline*

Age	No.	%	Age	No.	%
19	8	17·8	23	1	2·2
20	19	42·2	24	4	8·9
21	5	11·1	25	2	4·4
22	5	11·1	26	1	2·2

The apex beat in each subject was measured to the nearest ½ in. (0.6 cm.) from the midline, with the patient recumbent. It was found that the variation was from 2 in. (5 cm.) (1 case) to 5½ in. (14 cm.) (1 case) to the left of the midline, the maximal incidence being 3½ in. (8.9 cm.) (134 cases). The accompanying Graph gives the distribution of all the apex beats which were palpable.



Graph showing distribution of all apex beats that were palpable.

The average girth of the chest in the 500 cases was 34.6 in. (87.8 cm.); and in those in whom the apex beat was more than 4 in. from the midline it was 35.1 in. (89.1 cm.). Scoliosis as visible in the vertebral spines was found in 113 (22.6%) of the total series; and in 12 (26.6%) of the over-4-in. group. One or other shoulder was found to be significantly higher in 130 (26%) of the total, as compared with 16 (35.6%) of those with an apex beat over 4 in. These findings are shown in Table III.

TABLE III

	Total Series	Apex Beat Over 4 in. from Midline
No. of cases	500	45
Scoliosis	113 (22·6%)	12 (26·6%)
Scoliosis to left in thoracic region	67 (13·4%)	10 (22·2%)
Scoliosis to right in thoracic region	30 (6·0%)	2 (4·4%)
Shoulder higher	130 (26·0%)	16 (35·6%)
Average chest girth	34·6 in.	35·1 in.

The apex beat was found almost equally in the fourth and fifth intercostal spaces, and only in a very few in the third (2) and sixth (10) intercostal spaces. Occasional radiographs were taken in some of the cases above 4 in., and in all cases the apex beat as found clinically corresponded with the apex of the heart radiologically, and in no case was any cardiac enlargement detected.

Discussion

Examination of the results obtained shows that in no less than 11.4% of palpable cases the apex beat was over 4 in. to the left of the midline. According to previous standards many of these cases might have been regarded as due to cardiac enlargement. This is, however, extremely improbable in view of the subjects examined, who were all healthy young soldiers showing no clinical evidence of heart disease. Hartley (1948) has shown that in a large series of recruits examined radiologically 1% manifested apparent cardiac enlargement; out of 18 such cases followed up for some years, only eight had pathological enlargement.

Our impression was that anatomical landmarks, particularly the mid-clavicular line, were not easy to define and apply. From Table III it will be seen that there was little difference (less than 2%) in the average girth of the total series and of those with apex beat over 4 in. from the midline. Thus there would seem to be little to bear out the assumption of a direct relationship between the girth of the chest and the position of the apex beat.

Price (1927), Parkinson (1936), Lewis (1946), and Evans (1948) state that displacement of the heart may be caused by scoliosis. At first sight (Table III) this would not seem obvious; when, however, the direction of the thoracic scoliosis is analysed a marked preponderance of scoliosis to the left, as compared with that to the right, is apparent in those cases over 4 in. The ratio of thoracic scoliosis to the left compared with the right was 2 : 1 in the total series, and 5 : 1 in those with an apex beat over 4 in. It would therefore seem that scoliosis to the left in the thoracic region is a cause of cardiac displacement in a number of cases. Some, however, had no scoliosis, and in these another cause must be sought. Bramwell (1932), King, and Parkinson regard the height of the diaphragm as important in this respect; but this point could not be investigated in a purely clinical series. Foti (1937) points out that in a narrow thorax the apex beat may be carried to the left by the lateral thrust of the heart. Sternal depression has been emphasized by Evans (1946) as a cause of displacement.

In recent years much prominence has been given to the correct assessment of patients with abnormal cardiac signs. The "innocent" murmurs have been classified (Evans, 1947) and their recognition has prevented much unwarranted cardiac invalidism. R. K. Price (1949) showed that of 200 children referred to a cardiac clinic no fewer than 39 normal children had been restricted in their activities. In a similar way the finding of a displaced apex beat on medical examination may lead to the diagnosis of cardiac enlargement, with perhaps unnecessary invalidism and the production of a cardiac neurosis. Thus the finding of an apex beat outside the range previously accepted as normal cannot be regarded as pathological unless confirmed by other signs of heart disease or by cardioscopy. The cause may be sought in the structure of the chest, particularly with regard to scoliosis, or in the relation of the heart to the diaphragm. The recognition of this was emphasized by Sir John Parkinson, who said: "In the past it has often happened that this deceptive apex beat has been attributed to real enlargement indicating a cardiac lesion, and the stigma has followed a healthy subject, perhaps for a lifetime."

Summary

A series of 500 cases examined for the position of the apex beat is presented.

The normal distribution of the position of the apex beat is shown.

The apex beat was found to be more than 4 in. from the midline in 11.4% of those palpable.

Thoracic scoliosis to the left was considered to be a cause in some cases.

The necessity for differentiation between displacement due to structural causes and true cardiac enlargement is pointed out.

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A SIMPLIFIED METHOD OF BLOOD-SUGAR ESTIMATION*

BY

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The majority of the standard methods for blood-sugar determination are neither simple enough nor rapid enough for general use outside a laboratory. Furthermore, many of the existing methods measure, in addition to glucose, other reducing components of the blood. In recent years new or modified tests have been devised in an attempt to provide the general practitioner with a reliable method for use at the bedside, or at least in the normally equipped surgery. With the latter end in view some of the recent modifications have been examined and a modification of one of them (Haslewood and Strookman, 1937) is proposed

Recent Modifications

Hagedorn, Halstrom, and Jensen (1935).—This simplification of the earlier method of Hagedorn and Jensen uses a shorter period of heating, carried out over a naked flame, thus decreasing the amount of equipment required. An accuracy to within 3% of the older method is claimed. The combination of zinc hydroxide precipitation for protein removal with ferricyanide oxidation of the glucose gives results which approximate closely to true sugar values. The final operation, however, consists in the titration of liberated iodine, a procedure not readily performed outside the laboratory. Further, as the method is based on the estimation of surplus oxidizing agent, it is necessary for a blank determination to be carried out with each estimation—an unfortunate complication to add to any method designed for rapid use.

Lauber and Mattice (1944).—These authors describe an adaptation of the original method of Folin and Wu (1920), employing zinc hydroxide to precipitate the protein, but the precipitate has to be removed by centrifuging, necessitating the use of apparatus available only in the laboratory. Further, owing to the fact that some of the red cells may be laked before precipitation is completed, the values obtained are greater than the true glucose value.

Leech and Woodford (1948).—The use in this method of an oxidizing agent other than the conventional alkaline copper or ferricyanide solution permits a far simpler procedure to be planned. The reduction product of the oxidizing agent (3 : 5 dinitrosalicylic acid) has a sufficiently strong colour to enable it to be compared visually with

*A paper the substance of which was read in the Section of Medicine at the Annual Meeting of the British Medical Association, Harrogate, 1949.

standards without the addition of further reagents to produce a more intense colour, as in the case of Folin and Wu's method. Full examination of the procedure has revealed several deficiencies.

Two of these defects are recorded graphically in the calibration curves given in Fig. 1. The relationship between the colour increment and sugar level is linear over the range 90–450 mg. per 100 ml., but below this range there is sharp discontinuity and the reaction is less sensitive. The method is therefore not applicable to the estimation of values in the hypoglycaemic range, since it is impossible to distinguish visually between the colour changes at this level. The difference in slope between the two calibration curves prepared before and after an interval of three months indicated that the reagent was not stable. Since instability of the reagent affects the sensitivity of the method it would be necessary to use the standard glucose solution with each determination in order to calibrate the reagent. This considerably increases the complexity of the method.

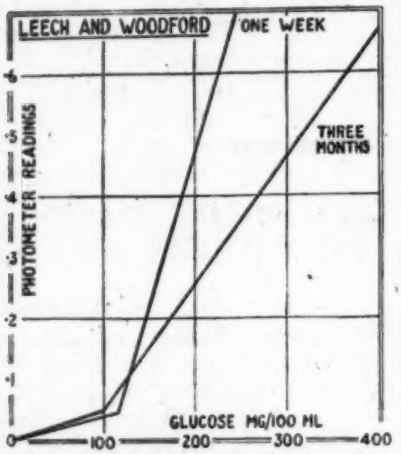

FIG. 1.—Calibration curves showing the instability of the Leech and Woodford method.

Haslewood and Strookman's Method: Necessary Alterations

In many respects Haslewood and Strookman's (1937) method also falls short of the ideal. It takes about 20 to 25 minutes to complete, and there are no fewer than nine operative steps. It is, however, capable of adaptation to give a method simple enough for occasional use.

In considering alterations to an existing method with a view to its simplification it is necessary to ascertain the degree of accuracy required in the final result. For all normal contingencies it will suffice if the general practitioner is able to distinguish between a normal individual and one whose condition is either definitely hypoglycaemic or hyperglycaemic. The finer details of blood-sugar determination are unnecessary. For this type of result a figure accurate to within 10 to 15% is adequate, and any refinements in method aiming at a higher degree of accuracy are unnecessary. Thus it is possible to replace accurately pipetted solutions by collection in graduated test-tubes. The final colour can be compared with a set of three standards, equivalent to sugar levels of 50, 150, and 300 mg. per 100 ml.

The removal of proteins from the blood is accomplished by the formation of copper tungstate complexes, and the precipitate so formed is easily filterable. No loss of accuracy can be observed between two sets of experiments, one employing a centrifuge for protein removal and the other filtration.

It is essential in a method to be used outside the laboratory that the reagents and standards should be unaffected by storage. The alkaline copper reagent as proposed by Haslewood and Strookman requires to be freshly prepared each day, but can be conveniently stored in two separate solutions, one of which contains the copper and the other

TABLE I.—*A Comparison of Results Obtained after Centrifuging and after Filtration*

Blood Levels (Mg./100 ml.)	
Centrifuging	Filtration
92	93
175	172
314	314
86	87
267	265

TABLE II.—*A Comparison of the Original Method with the Modification in which the Copper Solution is Added in Two Parts*

Blood Levels (Mg./100 ml.)	
Haslewood and Strookman	Modification
345	346
57	52
147	147
234	232
112	113

the alkali and the co-ordinating salts. No loss of sensitivity or accuracy is encountered if the two components are added separately (see Table II). The stability of the reagents after three months is illustrated in Fig. 2. The instability of the normal standards prepared from pure glucose solution has been overcome by the introduction of secondary standards for routine estimations. The oxidation of glucose by alkaline copper solution is not stoichiometric, but will proceed beyond the theoretical limits imposed by one reducing group per molecule owing to the further breakdown of glucose to smaller compounds with reducing properties. Thus the standards prepared by the interaction of copper reagent and glucose solutions, followed by colour formation between the liberated cuprous oxide and phosphomolybdate, darken on standing. The absorption curves given in Fig. 3 show how the colour, which consists of two components, one associated with molybdenum oxide and one with cupric ions, increases in depth and changes shade after 24 hours. The change in shade is due to the fact that the increase in intensity of the two components of the original colour is not identical, more of the molybdenum component (λ maximum 670 m.μ.) being produced than cupric ion (λ maximum 810 m.μ). Secondary standards can be made without recourse to the action of glucose by using a mixture of cuprous oxide and sodium phosphomolybdate and adding further cupric sulphate

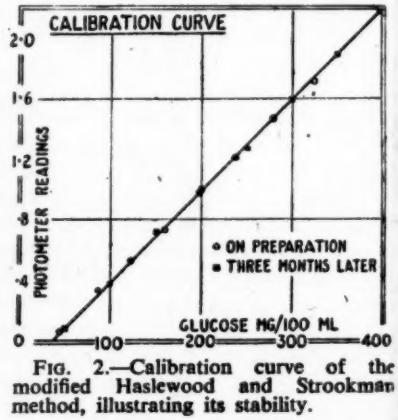

FIG. 2.—Calibration curve of the modified Haslewood and Strookman method, illustrating its stability.

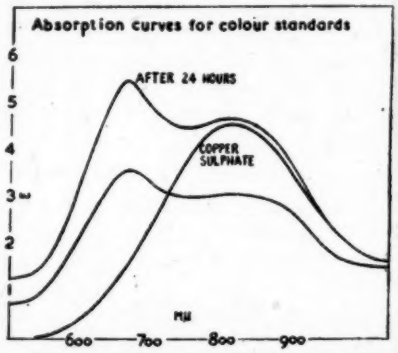

FIG. 3.—Curve showing how the colour increases in depth and changes shade after 24 hours.

solution until the absorption curve is identical with that of a freshly prepared glucose standard (Table III). Blood-glucose figures, determined by the method outlined below but compared with standards in a photo-electric colorimeter, showed good agreement with figures obtained from the same blood samples using the standard Hagedorn and Jensen method. Results for sugar levels in 10 consecutive blood samples estimated by both methods are given in Table IV. In a complete series of 60 estimations the two methods agreed with a standard error of 13.2% over the whole range from 30 to 380 mg. per 100 ml.

TABLE III.—*Method of Preparing the Secondary Standards*

50 mg./100 ml.	78 ml. H_2O, 1·5 g. $CuSO_4.5H_2O$, 0·5 ml. Solution 1
150 mg./100 ml.	48 ml. H_2O, 3·0 g. $CuSO_4.5H_2O$, 0·5 ml. Solution 1
300 mg./100 ml.	45 ml. H_2O, 6·0 g. $CuSO_4.5H_2O$, 0·0 ml. Solution 1

Solution 1: 59·5 mg. Cu_2O, 2 ml. H_2O, 3 ml. phosphomolybdate solution.

TABLE IV.—*Comparison of New Method with that of Hagedorn and Jensen*

New Method	H. & J.	New Method	H. & J.
110 ..	.. 97	235 ..	.. 236
29 ..	.. 39	130 ..	.. 147
224 ..	.. 226	66 ..	.. 58
76 ..	.. 76	176 ..	.. 182
148 ..	.. 154	81 ..	.. 102

Apparatus.—0.1 ml. wash-out blood pipette; test-tube graduated at 3.7 ml., with rubber bung; funnel and filter papers; test-tube graduated at 1, 1.5, 2, and 5 ml.; water-bath with spirit heater; set of standards.

Reagents (in Dropping-bottles).—Isotonic copper and sodium sulphate solution: 320 ml. 3% $Na_2SO_4.10H_2O$ and 30 ml. 7% $CuSO_4.5H_2O$. Sodium tungstate, 10% w/v. Solution A: 1.3% $CuSO_4.5H_2O$. Solution B: 2.4% sodium potassium tartrate; 4% sodium carbonate; 5% sodium bicarbonate; 3.68% potassium oxalate; 0.14% potassium iodide. Colour reagent: Phosphomolybdate solution of Folin and Wu (1920).

Method.—0.1 ml. of blood is collected from a finger or ear puncture and washed into 3.7 ml. of isotonic sodium and copper sulphate solution in the tube graduated at this level. (The determination may be stopped at this stage for an hour or two if necessary.) Four drops (0.2 ml.) of sodium tungstate are added and the tube stoppered and vigorously shaken. The protein precipitate is removed by filtration through a fluted paper and 1 ml. of the filtrate collected in the tube graduated at 1, 1.5, 2, and 5 ml. Solution A is added to the 1.5 ml. mark and Solution B to the 2 ml. mark, the tube being agitated after each addition. It is then placed in boiling water for 10 minutes. After cooling, the colour reagent is added to the 5 ml. mark and the colour compared with the standards.

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The British Council has arranged to hold courses this year for specialists from overseas on the following subjects: "The Nursing Profession" (Edinburgh, June 22–July 6); "British Health Services To-day" (Cardiff, May 31–June 14); "Public Health" (Bristol, September 8–29); "The Psychological Treatment of the Problem Child" (Glasgow, November 1–22); and "Juvenile Delinquency" (London, October 4–25). The average length of the courses is two to three weeks.

Medical Memorandum

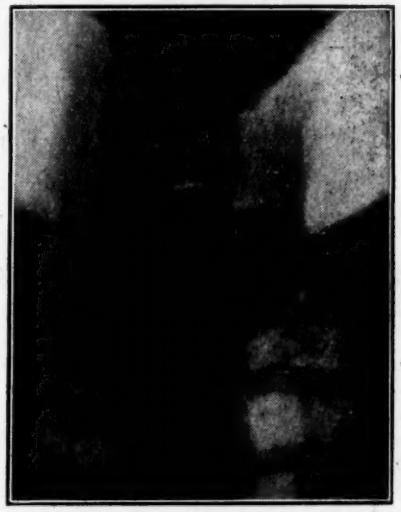
Foreign Body in Pharynx

The swallowing of foreign bodies by mentally deranged patients is an occurrence of considerable frequency. The variety and size of the objects have been described in many previous articles. The following case is recorded as the foreign body was exceptional in its type and size.

CASE REPORT

A man aged 32 had been an in-patient of a large mental hospital in the London area as a chronic schizophrenic with an escapist complex. He was noted for his ability to swallow foreign bodies, and gave a detailed account of previous objects he had successfully swallowed. During the morning of May 1, 1949, a quarrel occurred between the patient and another inmate, and the former extracted a crucifix from the pocket of the other patient and deliberately swallowed it. When seen 48 hours later his condition was poor, he was markedly dehydrated, and he complained of considerable soreness in his neck.

On examination the neck was found to be red and oedematous just below the cricoid cartilage. No foreign body was palpable. *X*-ray examination revealed a crucifix situated in the oesophagus, extending from the lower border of the cricoid cartilage to the upper border of the manubrium sterni, being held up just on the thoracic inlet and situated in an upright position (see illustration). Oesophagoscopy under gas, oxygen, and ether was performed on May 2 at the mental hospital, but the muscular relaxation was not sufficient to allow removal.



Radiograph showing position of the crucifix.

The patient was then transferred to Westminster Hospital, and it was decided to attempt removal by oesophagoscopy under general anaesthesia. Thiopentone induction, 0.6 g., was given, an intratracheal tube passed, and the anaesthesia maintained with gas and oxygen and 15 mg. of tubocurarine intravenously. Complete relaxation of constricted musculature was obtained. A large Mosher oesophagoscope was passed by Mr. Miles Foxen, and a curved wire was introduced through the hole at the upper part of the crucifix. The foreign body was then successfully trailed with minimal trauma. The crucifix was 2 in. (5 cm.) in length, with a transverse bar of 1¼ in. (3.2 cm.). Penicillin was given intramuscularly for three days. The patient made an uninterrupted recovery.

I wish to thank Dr. Beccle, superintendent of the mental hospital, Mr. G. T. Mullally, and Mr. Miles Foxen for permission to publish this case, and the Department of Medical Photography, Westminster Hospital, for the radiograph.

D. WYNN WILLIAMS, M.S., F.R.C.S.

During the year 1949 Dr. Barnardo's Homes admitted 1,219 boys and girls. In 84 years' work they have rescued about 138,500 needy children.

Reviews

THE COMPLETE CLINICIAN

Applied Medicine. By G. E. Beaumont, M.A., D.M., F.R.C.P., D.P.H. (Pp. 540; 74 illustrations. £1 10s.) London: J. and A. Churchill. 1950.

As if to confute those who suggested that his textbook of medicine was too obviously designed to get the student through his examinations, Dr. Beaumont has now produced this remarkable companion volume. *Applied Medicine* is not altogether a good title. It is essentially a physician's case book, and both the text and some of the subtitles, such as "An Error in Diagnosis," "A Missed Opportunity," "A Slimming Tragedy," and "The Phrygian Cap," give the illusion that one is reading Conan Doyle or Michael Innes. I say Michael Innes advisedly, because of the astonishing display of erudition in the literary and historical allusions and asides in the case histories.

The book is divided into four sections entitled "Descriptive Cases," "Short Notes on Cases," "Cases Demonstrated at the Bedside by Question and Answer," and "Idle Thoughts." The descriptive cases are well done and are not lacking in human interest or drama, as this quotation from "Two Cases of Gold Poisoning" shows.

> "The patient was unconscious throughout the day, and presented a pitiful and horrifying appearance such as I have never seen before or since. The deadly pallor of her face contrasted with the large purple patches of blood suffused around each eye, while drops of brighter hue bubbled from the nose and mouth. My fears of gold increased as I gazed on this dreadful sight; gold, so often the wrecker of human happiness, the poisoner of the body as well as of the mind."

In his ward round on a case of lead poisoning, Dr. Beaumont gives, among other things, brief biographies of Cheyne, Stokes, Hughlings Jackson, Burton, and Sir George Baker, a summary of the electroencephalogram, a detailed allusion to Chaucer's *Yeoman's Tale*, and an account of the Devonshire colic. This is really one of the most entertaining and instructive books on medicine which have appeared since Osler and Savill were in their prime, and I fear I must add that it looks like becoming compulsory reading for the M.R.C.P.

L. J. WITTS.

ORTHOPAEDIC TECHNIQUE

Campbell's Operative Orthopedics. Editor, J. S. Speed, M.D. Volumes 1 and 2. Second edition. (Pp. 1,643. 1,141 illustrations, two coloured plates. £7 10s. the set.) London: Henry Kimpton. 1949.

This book deserves more than the modest notice that usually suffices for a second edition. It has been thoroughly revised by Dr. J. S. Speed and Dr. Hugh Smith with nine collaborators, and only about a third of the original text has been retained. This vigorous action on the part of two of his most distinguished pupils would have appealed to Dr. Campbell, for he was one of the greatest of the pioneers in American orthopaedic surgery, who would have demanded that his successors should continue the advance.

In orthopaedics, perhaps more than in any other branch of surgery, it is more important to know when to operate and what operation to do than to be a master of technique. The worst mistakes come not from bad operating so much as from doing the wrong thing or doing the right one at the wrong time. In spite of this almost platitudinous truth orthopaedic surgeons have been great sinners, especially at their scientific meetings, by devoting so much time to discussions on technique—and in this respect Americans are even more blameworthy than ourselves. However, the study of technique is not to be despised and there is a place for books on operative orthopaedics. The Americans have led the way here with conspicuous success, and when Campbell's book appeared ten years ago it was quickly recognized to be the best of its kind. This second edition is still better. The two volumes together run to over 1,600 pages; they describe completely North American practice; there is an intelligent selection from the best European sources; and, though not encyclopaedic, the book will without doubt come to be accepted as the pre-eminent work of reference.

In general, the authors have confined themselves to describing sensible and well-recognized procedures without dilating on the indications for their employment or a critical analysis of the results. Theoretically, such comprehensiveness would have been welcome (it has been attempted with some success by another American author), but they had to draw the line somewhere. Where this wider approach is employed, however, the result is superb. Outstanding examples are the section on arthroplasty (powerfully reinforced by a description of Smith-Petersen's operation written by its originator); the essay on stabilization of the foot and ankle in the chapter on poliomyelitis; and the description of Boyd's work on congenital pseudarthrosis of the tibia. By contrast, the chapter on amputations, for instance, is dull and parochial. There is no considered discussion of the vital relationship between amputation and limb fitting, and British readers in particular will be sorry to find that no reference is made in the section on hind-quarter amputation to the pioneer work of Gordon-Taylor, whose experience must surely be unique. It was disappointing, too, to find space given to worthless operations such as suture of the brachial plexus and endoneurolysis. On page 884 there are trivialities about operations on the tibial tubercle, and in the description of the operative correction of torticollis subcutaneous tenotomy is summarily condemned, though in capable hands it is neither dangerous nor ineffective.

It would be ungracious to regard these and a few other shortcomings as more than superficial blemishes on a piece of work that must have called for herculean efforts from its authors, and in which the general standard of accuracy, writing, and illustration is exceedingly high. Drs. Speed and Smith will earn the gratitude of orthopaedic surgeons the world over for this invaluable work of reference. At the same time they have kept green the memory of a great American surgeon.

H. J. SEDDON

INFECTIVE RESPIRATORY OBSTRUCTION

Acute Laryngotracheobronchitis. By A. Harry Neffson, M.D. (Pp. 197; illustrated. $5.) New York: Grune and Stratton (381, Fourth Avenue, New York, 16). 1949.

This monograph of under 200 pages describes the pathology, clinical manifestations, treatment, and prognosis of acute obstructive infection of the larynx, trachea, and bronchi. It emphasizes that diphtheria immunization has reduced this particular infection to a very small percentage of all cases—10% in 1939 as opposed to 60% in 1929 at the Willard Parker Hospital, New York. It will come as a surprise to English readers, however, to learn that some 1,400 cases of non-diphtheritic infective obstruction were admitted to this hospital between 1931 and 1940. The greatest number of cases were between the ages of 1 and 2 years, and it is generally a childhood complaint. In the Western Hemisphere it appears to be a common

emergency, calling for skilled interpretation and specialized treatment by teams with experience and judgment.

Although we are fortunately not often faced with these cases, there is much that we can learn from Dr. Neffson's small book. His comprehensive survey and interpretation of symptoms, his emphasis on the importance in treatment of distinguishing between supra- and infra-glottic oedema, and the chapters on diagnosis and differential diagnosis all reveal keen clinical acumen and practical knowledge. If the section on differential diagnosis is guilty of "textbook" thoroughness and includes many rarities this can perhaps be excused, for the book is otherwise severely practical. The articles on management and treatment are admirable and full of wisdom.

The author's advocacy of intubation (whenever suitable) in preference to tracheotomy will surprise many who have probably never seen intubation performed or had come to think of it as out-moded. The pros and cons are so convincingly debated, however, that we must consider this still to be a useful therapeutic measure in the right type of case. The value and technique of suction are fully discussed.

I was not happy about the suggestion of cleaning the inner tube of a tracheotomy by pushing pledgets of cotton-wool through with a wooden applicator. A well-made bottle brush or pipe cleaners should be used, and nothing which can break or parts of which can be left behind "round the corner" is ever justifiable. I am afraid the price of this small volume will prohibit its purchase on a large scale, but it is worthy of a place in all medical libraries, and should be sought out especially by paediatricians, laryngologists, and those specializing in zymotic diseases.

F. C. W. CAPPS.

COLD BATHS AND COMMON SENSE

Masochism in Modern Man. By Theodor Reik. Translated by Margaret H. Beigel and Gertrud M. Kurth. (Pp. 439. $6 or £1 5s.) New York: Farrar, Straus and Co. London: George Allen and Unwin.

It is one of the fundamental teachings of psycho-analysis that the organism is orientated towards nullifying the effects of stimulation. Many stimuli arise from within, such as those caused by hunger, and by them the organism is driven to assuage its appetites. This superficially attractive doctrine is the root cause of a great deal of theoretical superstructure which is, to the non-analyst, absurd. At no place is there any room in the theory for the causation of pleasurable emotions by stimulation itself. The pleasures one may derive from a cold shower, from a walk in a high wind, or from a bob-sleigh run are not intelligible, except by tortuous processes of reasoning, to the analyst. That toning-up of the system which can be experienced in strenuous engagements, in enduring discomforts, in facing perils, and in attacking difficult and disagreeable tasks are, the analyst says, forms of masochism and manifestations of the death instinct. What perversity is this! Surely one should say, this is life itself.

It is not to be denied that there is a genuine masochism, commonly defined as the experiencing of sexual pleasure in suffering pain or humiliation. By psychological processes, some would say processes of conditioning, the sexual instinct may couple itself with objects and ideas of an apparently remote kind—with a woman's shoes or a headmaster's cane, with the experiencing of pain, or vertigo, or anxiety. It is when the author of this work, following in the steps of Freud, expands the sexual theory of psychodynamics to every sort of behaviour and psychological experience that one is conscious of a defect in a doctrine which might have seemed well enough confined to its natural field. Elementary aspects of normal psychology are distorted beyond recognition. If we enjoy a meal more keenly when it has been preceded by hunger, if the drinker says he would not sell his thirst for a five-pound note, if we get more pleasure out of what has been bought and paid for than out of what has come gratis, has it any meaning to call these things masochistic? We would probably do better to call in the aid of Gestalt psychology, and to think of contrast phenomena.

It is, however, a fundamental directive of psycho-analysis to disregard the promptings of common sense. In following this principle the analyst sometimes attains an insight which is not easily attainable by less fantastic means. If some of Reik's ideas strike the reader as bizarre, others will be welcomed as suggestive or illuminating. The translation is so good that the book may be read with pleasure. Those who hold psycho-analytic views will probably find it valuable, although the author takes a line which is, by psycho-analytic standards, at times heterodox.

ELIOT SLATER.

PATHOLOGY OF BONE

Tumors of Bone. By Charles F. Geschickter, M.D., and Murray M. Copeland, M.D. Third edition. (Pp. 810; illustrated. £5 5s.) Philadelphia and London: J. B. Lippincott Company.

The first edition of this book was written eighteen years ago and was based on the case histories and pathological material available in the Department of Surgical Pathology of the Johns Hopkins Hospital. Since that time a large number of the original cases have been followed up and many new ones studied. In this, the third edition, 500 fresh reports have been added, and the authors have now collected over 3,000 cases of disease of the skeleton. Approximately 1,400 of these are of primary tumours arising in osseous tissues.

The remainder of the book is planned to assist differential diagnosis. It includes well-illustrated accounts of almost every disease of the skeleton which might be confused with, predispose to, or help our understanding of primary tumours arising in skeletal mesenchyme. This section occupies about one-fifth of the text, and describes such conditions as hereditary chondrodysplasia, bone cysts, generalized osteitis fibrosa, the many forms of chronic inflammatory bone disease, osseous changes in the reticuloses, the skeletal dystrophies peculiar to young children, and monostotic and polyostotic fibrous dysplasia, osteoid osteoma, and the skeletal changes in diseases of the endocrine organs. It is clear that the scope of the work is far wider than its rather misleading title suggests.

From a study of 750 cases of osteogenic sarcoma the authors find that all those surviving for five years or longer after diagnosis had been submitted to early radical surgery. A classification of the disease is suggested which, though not founded on strict histological features, has proved of value for clinical and prognostic purposes. In the first group, primary chondrosarcoma, the percentage of five-year cures was 15; in the second, osteolytic sarcoma, 16; and in the third, the sclerosing form, 21.

The general plan of the book is excellent. The clinical descriptions are graphic and the radiological and morbid anatomical illustrations excellent. The authors have a regrettable tendency to dogmatize in connexion with the histogenesis of primary bone tumours, each variety of which they derive from small cellular foci of undifferentiated skeletal mesenchyme persisting in various situations in the adult skeleton. This is an attractive hypothesis but not, as the authors believe, a well-attested fact, for anaplasia may be supposed to be the simple and direct consequence of rapid cellular multiplication.

Written against the impressive background of so large a number of clinical, radiological, and pathological records, the book must be regarded as an authoritative and indispensable work of reference for surgeons, especially those who shoulder the heavy responsibility of the care of cases of primary bone tumour.

GEOFFREY HADFIELD.

TRACE ELEMENTS

Trace Elements in Food. By G. W. Monier-Williams, O.B.E., F.R.I.C. (Pp. 511. £1 10s.) London: Chapman and Hall. 1949.

The author, who is an authority on food chemistry, defines trace elements as those present in the human body or in foods in amounts up to 0.005%. Some twenty-two elements are described, including some of more toxicological than nutritional interest, such as indium and selenium. Each element is discussed from the standpoints of its absorption, distribution, retention, and excretion. The functions of the physiologically active elements are explained, and the effects of deficiency described where appropriate. There are sections on toxicology, the distribution of elements in food, the public health and legal aspects of the subject, and the estimation of these substances in foodstuffs. An account is given of the manner in which trace elements gain access to food, from the soil or by contamination, and of the methods of avoiding such contamination. A good balance is preserved between these various aspects of the subject, although, as would be expected, considerable space is given to the methods of estimating trace elements in food. A general outline of methods is presented rather than detailed laboratory procedure, the reader being referred to the literature for details. There is a good bibliography at the end of each chapter.

Although primarily intended for the food chemist, this book will be of value to the nutritionist, analytical chemist, industrial toxicologist, and the worker in forensic medicine and public health. Presumably the book went to press before it was discovered that cobalt was an essential constituent of vitamin B_{12}. Reference is not made to the increased use of fluorine compounds in industry—e.g., in refrigeration and insecticides—nor to the use of the silicones, as in the baking industry. These are minor omissions, however, and do not detract from the value of this excellent and most useful book.

F. PRESCOTT.

Detailed Atlas of the Head and Neck, by Raymond C. Truex and Carl E. Kellner (pp. 162; £3 15s.; New York and London: Oxford University Press, 1948), contains 136 excellent plates, most of them in colour. The first and largest of its four sections depicts regional anatomy and includes a series of plates on the gross anatomy of the brain. The illustrations are of original dissections and frequently depict stages in the progress of the same dissection; some of the approaches are unorthodox and illuminating. The second section deals with osteology, and the third and fourth contain a series of progressive coronal and transverse sections. The terminology used is an anglicized one which does not always follow the Birmingham Revision, and occasionally confusion may arise from the same structure receiving different names in different plates. Anatomical errors in the illustrations are very rare, but there are a few noticeable omissions. The parathyroid glands are nowhere figured, and the submental lymph nodes are shown only in one of the coronal sections, where they are not labelled. The skull of an infant might have been shown, and such features as the pterion labelled on the adult skull. It is common to find that students do not adequately appreciate the relation of the various parts of the brain to the adjacent tissues, which is clearly demonstrated in this atlas. As a substitute for an actual dissection (and no atlas can be more), it should prove invaluable to the student working for a higher degree who has no opportunity to dissect this most troublesome of anatomical regions.

BOOKS RECEIVED

Review is not precluded by notice here of books recently received.

Handbook of Surgical Urology for Interns, Hospital Corpsmen and Nurses. By N. F. Ockerblad, M.D., F.A.C.S. (Pp. 189. 31s. 6d.) London: Baillière, Tindall and Cox. 1949.

A Textbook of Histology for Medical Students. By E. E. Hewer, D.Sc.Lond. 5th ed. (Pp. 432. 25s.) London: William Heinemann. 1949

Man the Tool-maker. By K. P. Oakley. (Pp. 98. 2s. 6d.) London: The British Museum. 1949.

History of the Primates. By W. E. Le Gros Clark, F.R.S. (Pp. 117. 2s. 6d.) London: British Museum. 1949.

Essentials of Obstetrical and Gynecological Pathology. By R. L. Faulkner, M.D., F.A.C.S., and M. Douglass, M.D. 2nd ed. (Pp. 357. 60s.) London: Henry Kimpton. 1949.

The Chemical Analysis of Foods. By H. E. Cox, Ph.D., D.Sc.Lond. 4th ed. (Pp. 340. 28s.) London: Churchill. 1950.

Principles and Practice of Therapeutic Exercises. By H. Kraus, M.D. (Pp. 309. 47s. 6d.) Springfield, Ill.: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1949.

Physiology of Heat Regulation and the Science of Clothing. Edited by L. H. Newburgh, M.D. (Pp. 457. 37s. 6d.) Philadelphia and London: Saunders. 1949.

Genetics, Paleontology, and Evolution. Edited by G. L. Jepsen and others. (Pp. 474. 48s.) Princeton, New Jersey: Princeton University Press. London: Geoffrey Cumberlege. 1949.

Intestinal Intubation. By M. O. Cantor, M.S., M.D. (Pp. 333. 55s.) Springfield, Ill.: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1949.

Annals of Roentgenology. Vol. 17. Roentgen Diagnosis of the Extremities and Spine. By A. B. Ferguson, M.D. 2nd ed. (Pp. 519. No price.) New York: Paul B. Hoeber. London: Cassell. 1949.

Anus-Rectum Sigmoid Colon. By H. E. Bacon, M.D., F.A.C.S. 3rd ed. Vols. 1 and 2. (Pp. 1,127. 220s.) Philadelphia, London, and Montreal: Lippincott. 1949.

Human Pathology. By H. T. Karsner, M.D., LL.D. 7th ed. (Pp. 927. 90s.) Philadelphia, London, and Montreal: Lippincott. 1949.

Blood Clotting and Allied Problems. Edited by J. E. Flynn. (Pp. 231. $2.25.) New York: Josiah Macy, jun., Foundation. 1949.

Biological Antioxidants. Edited by C. G. Mackenzie and others. (Pp. 146. $2.70.) New York: Josiah Macy, jun., Foundation. 1949.

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RESPONSIBILITY FOR MURDER

Whether a man proved to have killed another is to be held responsible for his deed is a problem that has increasingly taxed the judgment of law courts in recent years. As the science of psychology has developed, insanity has been pleaded more often, and since 1843 juries have had to decide the issue in accordance with the M'Naghten Rules, which were formulated by the judges of the King's Bench not in the course of a trial but on the request of the House of Lords. Under these rules a defence on the ground of insanity can be sustained only if it can be clearly proved that, "at the time of committing the act, the party accused was labouring under such a defect of reason, from disease of the mind, as not to know the nature and quality of the act he was doing, or, if he did know it, that he did not know he was doing what was wrong."

All the operative words comprising this formula have been scrutinized at various times and their meaning interpreted. But many doubt to-day whether they define responsibility in terms acceptable to society or to the great majority of its members. That is one problem before the Royal Commission on Capital Punishment, which last week heard the B.M.A. delegation support orally the written evidence it had presented; accounts of these appear elsewhere in this issue. The B.M.A. argues strongly that the M'Naghten Rules are no longer adequate to their purpose. The Association's evidence is a carefully considered attempt to express, on a subject where there is some difference of opinion, what most medical psychologists and psychiatrists consider to be more accurate guidance than is found in the M'Naghten Rules.

The B.M.A.'s main criticism is of the phrase "defect of reason." When the M'Naghten Rules were framed a man's responsibility for his actions was held to depend upon his reason's being unimpaired; his responsibility diminished only if his reason was clouded. The effect of emotion was conveniently disregarded. The Association therefore proposes that the M'Naghten Rules should not be limited to defects of reason but should be extended to cover disorders of emotion, and it emphasizes that the phrase "disease of the mind" should refer to cases of mental defect as well as grave disturbance of mental health.

In advocating a special verdict for appropriate cases with some such words as "guilty, but with diminished responsibility," the Association criticizes the M'Naghten Rules because they over-simplify the issue before the jury. There are an infinite number of gradations between full knowledge and lack of knowledge of the nature and wrongfulness of an act, and Scottish practice already admits that diminished responsibility reduces the quality of the act from murder to culpable homicide.

If these suggestions are adopted they should go far to remove the apprehensions recently expressed by Lord Goddard[1] before the Royal Commission when he criticized the use to which the Criminal Lunatics Act of 1884 is being put. There have been cases in which the jury found a man sane in accordance with the M'Naghten Rules and guilty of murder, but after the trial and as a result of a private inquiry the prisoner is pronounced insane. Few doubt that justice has been arrived at in the end, but a shorter and fairer approach to it would be opened up by modifying the Rules.

In so far as execution itself is concerned medical men are entirely opposed to any method "which would require the services of a medical practitioner either in carrying out the actual process of killing or in instructing others in the technique of the process." Their duty there is clear. But where medical men are apt to be embarrassed by a conflict of principles is in the witness box. Many believe that an independent panel of experts, trained to ascertain the facts by questioning and examining the patient, is more likely to determine the true state of the prisoner's mind than is the existing method, where medical witnesses called for the prosecution and defence each give evidence that is often in conflict. The B.M.A. on the whole thinks that justice is best served by the present procedure, but makes the important proviso that the defence should have the opportunity of carrying out a complete investigation of the prisoner's state of mind or of obtaining access to the results of such an investigation.

[1] *British Medical Journal*, 1950, 1, 196.

DIAGNOSIS OF HEART DISEASE

The importance of a correct answer to the question whether or not a patient has heart disease can scarcely be over-emphasized, for a mistake either way is apt to have disastrous consequences. Some of the common diagnostic difficulties encountered in daily practice are discussed by Dr. A. Rae Gilchrist and by Dr. D. Rhodes Allison in papers appearing in this issue. Historically no such discussion can be complete without paying homage to Mackenzie and Lewis for stressing the innocence of many systolic murmurs and for distinguishing serious disorders of rhythm from the trivial. Disregard for the systolic murmur, however, is receiving a timely

check. Thus basal murmurs may be due to calcific aortic stenosis, coarctation of the aorta, or to hyperkinetic circulatory states, all of which are being recognized with increasing frequency; pulmonary systolic murmurs may be due to atrial septal defect, which is proving to be the commonest form of congenital heart disease; and loud mitral systolic murmurs, whether early or late, often denote mitral incompetence. Although the great majority of ectopic beats are undoubtedly innocent, their occurrence in ischaemic heart disease and perhaps in diphtheria may be more sinister. Again, auricular ectopic beats appear to be closely related to paroxysmal auricular tachycardia, auricular flutter, and auricular fibrillation.

Dr. Gilchrist, who covers much ground in his paper, briefly discusses the differential diagnosis between vasovagal syncope, Ménière's syndrome, Stokes–Adams fits, and epilepsy, and rightly emphasizes the characteristic flush that follows a Stokes–Adams fit—a flush preceding loss of consciousness is equally characteristic of the climacteric (in both sexes). Although Fuller[1] described innocent left inframammary pain in this *Journal* as long ago as 1858, confusion between it and angina pectoris has only recently become rare. It is clear that this pain originates locally where it is felt,[2] and Dr. Allison draws attention to that variety of local chest-wall pain due to muscle strain. When this pain is central or parasternal it is frequently mistaken for coronary occlusion. He also describes a central type of spontaneous "fibrositic" pain similar in other respects to left inframammary pain, and he reminds us that central chest pain may be referred from the spine. All this is well known; the interest lies in the fact that such pains were responsible for 10% of cases referred to hospital with a diagnosis of angina. Another source of confusion is pain referred from the gut. While diaphragmatic hernia may afford the best example of such pain, it is relatively rare, and the majority of oesophageal or gastric pains which bear some resemblance to angina pectoris depend on purely functional disturbance.[3]

Although the quality of the pain, its relation to specific movements or type of effort, its aggravation by deep breathing, the presence of local tenderness, and other details of its behaviour may serve to distinguish innocent central chest pain from angina pectoris, the importance of a correct diagnosis demands objective proof if it can be obtained. Recent electrocardiographic work is encouraging in this respect. Using a modification of Master's[4] effort test, Wood and his associates at the Institute of Cardiology have obtained diagnostic curves in 90% of patients with clinically certain angina whose resting graphs were normal. The inhalation of 10% oxygen requires more apparatus, is time-consuming, and gives positive results in only 50% of cases.[5] In the differential diagnosis of acute cardiac infarction Gilchrist pays close attention to massive pulmonary embolism. The electrocardiogram reproduced in his paper is typical of acute cor pulmonale and of course bears no relationship to pulmonary infarction. Wood has shown that the original pattern may not be restored for several weeks.[6] The T-wave changes in the right-sided chest leads are so dominant that they may overcome positive potentials ordinarily associated with such conditions as hypertensive heart disease, left bundle-branch-block, and posterior cardiac infarction. Transient right bundle-branch-block occurs in at least 10% of these cases. Two other conditions that may be confused with cardiac infarction clinically and electrocardiographically are acute pericarditis and dissecting aneurysm. Pericarditis may cause elevation of the S-T segment in all leads except VR, but there are no pathological Q waves. Dissecting aneurysm may rupture into the pericardial sac and cause similar electrocardiographic changes, or dissection may involve and occlude one or other of the coronary vessels and so cause true infarction.[7] Many other conditions may simulate cardiac infarction, but unipolar limb leads and multiple V chest leads should prevent error. Acute coronary insufficiency or status anginosus may be recognized by finding persistent depression of the S-T segment in left ventricular surface leads or their equivalents.[8]

Oedema, in the absence of a raised jugular venous pressure, is rarely due to heart failure. Gilchrist mentions premenstrual oedema, and lymphatic oedema of the Milroy type may also lead to errors in diagnosis, particularly when unusually late in onset. It is by no means easy to distinguish clinically between the oedema of heart failure and the oedema of nephritis. Patients with acute nephritis usually complain of dyspnoea and the jugular venous pressure is frequently raised, as it is in most instances of sodium retention whatever the cause (including premenstrual oedema). The situation is further complicated by the occurrence of a peculiar form of cardiopathy in acute nephritis[9] and by the frequency of pulmonary oedema. It is now recognized that a diminished renal blood flow, sodium retention, an increased blood volume, a raised venous pressure, and oedema are common to both heart failure and acute nephritis.[10] A raised venous pressure itself is usually interpreted as evidence of heart failure; but an increased blood volume from other causes, tricuspid stenosis or incompetence, Pick's disease, pericardial effusion, partial superior-vena-cava obstruction, and heart block must be excluded. Again, certain forms of heart disease, such

[1] *British Medical Journal*, 1858, 975.
[2] Wood, P., ibid., 1941, 1, 767.
[3] Morrison, L. M., and Swalm, W. A., *J. Amer. med. Ass.*, 1940, 114, 217.
[4] Master, A. M., and Oppenheimer, E. T., *Amer. J. med. Sci.*, 1929, 177, 223.
[5] Levy, R. L., Bruenn, H. G., and Russell, N. G., ibid, 1939, 197, 241.
[6] *Brit. Heart J.*, 1941, 3, 21.
[7] Oram, S., and Holt, M. C., ibid., 1950, 12, 10.
[8] Freedberg, A. S., Blumgart, A. L., Zoll, P. M., and Schlesinger, M. J., *J. Amer. med. Ass.*, 1948, 138, 107.
[9] Whitehill, M. R., Longcope, W. T., and Williams, R., *Bull. Johns Hopk. Hosp.*, 1939, 64, 83.
[10] Merrill, A. J., *J. clin. Invest.*, 1946, 25, 914.

as simple pulmonary stenosis, primary pulmonary hypertension, and mitral stenosis, may be compensated by a raised venous pressure, which helps to distend the right ventricle and so to increase the force of its contraction: a satisfactory cardiac output may be maintained in this way. The hyperkinetic circulatory states (including pregnancy) usually have a raised venous pressure for the same reason. Enlargement of the liver offers confirmatory evidence of heart failure if the venous pressure is also raised. But when ascites complicates cirrhosis the jugular venous pressure may be a little raised, and if a large liver is due to secondary neoplasm hepatic failure may lead to a hyperkinetic circulatory state which, as just mentioned, may be associated with a raised jugular venous pressure. There is in fact hardly a symptom or physical sign of heart disease or of heart failure that cannot have another interpretation. Yet a careful history and the pattern formed by a combination of physical signs should lead to a correct diagnosis in most cases, and modern methods of investigation can be used to resolve any remaining doubts.

CANICOLA FEVER

The six human cases of canicola fever (leptospirosis canicolaris) recently recognized in Bristol and described by Dr. A. M. G. Campbell and his colleagues elsewhere in this issue illustrate some of the features of a disease which probably has a higher incidence than is generally appreciated. Although Minkenhof[1] could collect reports of less than 100 cases from world sources, there seems little doubt that more than 40 (mostly unpublished) have occurred in this country alone during the past two years. The infecting organism, *Leptospira canicola*, like *L. icterohaemorrhagiae*, which causes Weil's disease, belongs to the family of spirochaetes. Unlike most leptospires, however, it has no rodent carrier host, being a parasite of dogs, from which it is occasionally transmitted to man. *L. canicola* was first isolated from dogs by Klarenbeek and Schüffner,[2] and from man by Dhont and his colleagues.[3]

In man an attack of canicola fever usually begins abruptly, with shivering or rigors, and the temperature mounts rapidly to 103°–104° F. (39.4°–40° C.). The pyrexia is accompanied by very severe headache, photophobia, muscular tenderness, nausea, and vomiting. Signs of meningeal irritation are common—vertigo, stiffness of the neck, and a positive Kernig's sign—and patients, such as two of those in the Bristol series, are often thought to be suffering from meningitis.[4] Poliomyelitis may be suspected if weakness or paresis of voluntary muscles is present. When meningeal symptoms are slight or absent the condition may be mistaken for a severe attack of influenza. In other instances congestion of the lungs is the main feature during the early stages,[5] and pneumonia may be suspected. The conjunctival vessels are often congested, and profuse sweating may be an early symptom. Rashes, either morbilliform or scarlatiniform in type and lasting for only a day or two, are commoner than in true Weil's disease. A relative bradycardia is the rule. Dimness of vision or other ocular manifestations may occur at any time during the illness or convalescence; vitreous opacities developed in one patient eight months after recovery.[6] These eye symptoms all clear up under treatment and leave no permanent disability. The cerebrospinal fluid may be normal during the first few days, but by the fifth to seventh day the protein content and the cell count both increase. The number of cells varies from a score or so to 1,500 or more per c.mm. Lymphocytes are usually present in greater numbers than polymorphs. The glucose and chlorides are unaltered. Leptospires may be isolated from the fluid by culture or by inoculation into hamsters, which are much more susceptible to this infection than guinea-pigs. The extent of kidney damage varies widely, but some degree of nephritis is almost always present. A moderate amount of albumin and casts and red blood corpuscles are generally found in the urine. In mild cases the transient albuminuria may be missed unless daily tests are made. The blood urea is raised only slightly as a rule, but in two reported cases it reached 280 and 576 mg. per 100 ml. respectively, and the urinary output fell alarmingly.[7 8] These patients were gravely ill for some days, but both recovered. The febrile period continues for about one week, after which the temperature falls and the symptoms begin to subside. In a number of cases, however, a recrudescence of fever, accompanied by a return of symptoms in milder form, takes place towards the end of the second week and lasts for five or six days. Further relapses are rare, and convalescence is uninterrupted though invariably slow. Loss of hair is stated to be not uncommon in dogs,[9] and has been reported as a distressing sequel in man.[10]

The prognosis is good unless the kidney function is already impaired by pre-existing disease. Two deaths

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1 *Lancet*, 1948, **2**, 8.
2 *Ned. Tijdschr. Geneesk.*, 1933, **77**, 4271.
3 Dhont, C. M., Klarenbeek, A., Schüffner, W. A. P., and Voet, J., ibid., 1934, **78**, 5197.
4 Harvier, P., Claisse, R., and Marche, J., *Paris méd.*, 1946, **36**, 381.
5 Gunther-Kuhne, H., Rimpau, W., and Schubert, H., *Dtsch. med. Wschr.*, 1949, **74**, 129.
6 Snapper, I., Chung, H. L., Chu, I., and Chen, K. C., *Chinese med. J.*, 1940, **58**, 408.
7 Bukh, N., *Ugeskr. Læg.*, 1940, **102**, 1142.
8 Audoly, P., *Bull. Soc. méd. Hôp. Paris*, 1948, **64**, 203.
9 Winsser, J., *Z. InfektKr. Haustiere*, 1943, **59**, 103.
10 Port, F., and Rimpau, W., *Med. Mschr.*, 1948, **2**, 33.
11 Ruys, A. Ch., cited by van Thiel, P.H., *The Leptospiroses*, 1947, p. 139. Leiden.
12 Weech, R. S., Colquhoun, J., and Broom, J. C., *Lancet*, 1949, **1**, 906.
13 Mills, S., *Vet. Rec.*, 1948, **60**, 267.
14 Brunner, K. T., and Meyer, K. F., *Proc. Soc. exp. Biol., N.Y.*, 1949, **70**, 450.
15 Heilman, F. R., *Proc. Mayo Clin.*, 1948, **23**, 569.
16 Stuart, R. D., *Vet. Rec.*, 1946, **58**, 131.
17 Joshua, J. O., and Broom, J. C., ibid., 1949, **61**, 711.

from uraemia have been reported[11 12]; polycystic disease of the kidneys was found in one patient at necropsy, and the second had suffered for many years from chronic interstitial nephritis.[8] The important diagnostic features are severe, intractable headache, suffusion of the conjunctivae, muscular tenderness, and albuminuria. These symptoms are of course equally characteristic of the anicteric form of true Weil's disease, and the differentiation can be made only by bacteriological methods. Leptospires can be isolated from the blood or cerebrospinal fluid during the first week and from the urine about the 12th to the 22nd day. Antibodies appear in the blood about the seventh day, reach a maximum during the third or fourth week, and can still be demonstrated for a number of years after recovery. No specific antiserum is available for treatment, and drug therapy, except for antibiotics, does not modify the course of the disease. Penicillin has been found to be very effective in the acute stage in dogs,[13] but experiments have shown that it does not eradicate leptospires once they have settled in the kidneys[14]: streptomycin, on the other hand, is effective whatever the stage of the disease. It is difficult to estimate the value of penicillin in the human disease since the death rate is so low and the number of cases treated is comparatively small. The reports also are conflicting, perhaps because penicillin administration was begun at different intervals of time after the onset of symptoms. It appears, however, that the drug has a curative action provided that it is given early, and it is advisable to begin treatment with it in every case. No records have yet been published of the results obtained with streptomycin or aureomycin, though the latter also is effective in experimental infections.[15]

Infection with *L. canicola* is widespread among dogs, and surveys in Great Britain[16 17] have provided serological evidence that up to 40% of dogs have been infected during their lifetime. The common form of the disease in dogs is an acute nephritis, leading to uraemia, but milder infections also occur. In addition, dogs may act as carriers without showing any signs of illness. Large numbers of leptospires are excreted in the urine, except in the fulminating cases in which death takes place within a few days, and the infection thus spreads to other dogs and sometimes to man. The epidemiological evidence from Bristol supports the view that *L. canicola* is not highly infective for man, and therefore the likelihood of contracting the disease from a dog is not great. Dog owners, however, should be warned that the urine of sick dogs, and even of apparently healthy puppies, may be a source of danger, and they should be advised about appropriate precautions. Another way in which the infection may be contracted is by bathing in stagnant fresh water fouled with dog urine. Measures to reduce this possible danger would obviously be difficult to apply.

PREVENTION OF INFIRMITY

On July 5, 1948, the two hospital services of this country, the voluntary and the municipal, became merged into one, and the medical staffs of many of the voluntary hospitals were confronted with what at first glance must have seemed the result of neglect and lack of treatment in municipal hospitals. In these hospitals lay a large number of "chronic sick" patients, the majority of them elderly, for whom little or no attempt at rehabilitation had been made. The reason for this was in part to be found in the separation of the two services: the voluntary hospitals aimed at a rapid turnover of acutely sick persons and had succeeded, while the municipal hospitals, working originally under the Poor Law, catered for the destitute, using this word in its widest sense. As is well known, there were among the municipal hospitals appropriated under the Local Government Act of 1929 a number which had been transformed into excellent hospitals for the acutely ill and were no longer greatly interested in the welfare of the destitute. It may be said, however, that until a few years ago the medical profession generally would have advised that there was little that could be done for these unfortunates beyond keeping them as comfortable as possible until they died.

A feeling that something was wrong with this attitude was growing before the war, and at the same time it became known that at one or two of the hospitals for the chronic sick active treatment was being given with remarkable results—notable among these pioneers was Dr. Marjory Warren at the West Middlesex Hospital. At the end of the war the Nuffield Foundation published a report, *Old Age*,[1] in which for the first time attention was drawn to some of the difficulties with which the aged have to contend, and since then a number of surveys of patients in municipal hospitals have appeared, of which an analysis of 701 patients in the chronic sick wards of the Bradford hospitals is one of the most recent and informative.[2] From inquiries of this nature it has been found that many elderly persons are being kept in hospitals for no adequate medical reason. Elsewhere in this issue Professor Thomas McKeown and Dr. C. R. Lowe publish the third part of their very carefully compiled report on the care of the chronic sick. They have found that in Birmingham 12 in every thousand of those over 65 are in hospital, and at the same time it is known that there are many elderly persons lying ill in their homes for whom a hospital bed should be available. Much can be done to rehabilitate a large number of these elderly patients, even by surgical treatment if necessary, for, as Mr. Peter Childs and Dr. S. A. Mason have recently pointed out in this *Journal*,[3] they tolerate many major operations well. It is now becoming clear

[1] *Old People*, 1947, London.
[2] McEwan, P., and Laverty, S. G., *The Chronic Sick and Elderly in Hospital*, 1949. Report to the Bradford (B) Hospital Management Committee.
[3] *British Medical Journal*, 1949, **2**, 1389.
[4] Bluestone, E. M., *Med. Clin. N. Amer.*, 1949, **33**, 587.
[5] *The Social Medicine of Old Age*, 1948, London.

that it is not necessarily shortage of beds that makes it so difficult to secure the admission of an elderly patient to hospital, but that the wrong person is in whatever bed should be available.

The distaste with which many an elderly patient regards the suggestion that a stay in hospital may be beneficial is understandable. As Dr. J. H. Sheldon points out in his F. E. Williams Lecture on "The Role of the Aged in Modern Society" (published as the opening paper in this issue), it will become necessary for the hospital, in close co-operation with the general practitioner, to organize a home–hospital service that will make it possible for the elderly patient to enjoy the advantages of hospital treatment without the need of being admitted to one of its beds. Such a service, based on the general practitioner, would be partly domiciliary, but would also depend upon cars and ambulances to bring patients at frequent and regular intervals to, for example, the physiotherapy department. Treatment can be given frequently enough to be of real benefit when a small number of trained persons can supervise a large number of patients, either individually or in classes. A home–hospital service has been in use for some years at the Montefiore Hospital in New York,[4] and in England it has been started in a few hospitals, notably by Dr. E. B. Brooke at St. Helier Hospital, Carshalton. It has the effect of turning patients at present confined to their room or house into ordinary members of the community once more, and, since it familiarizes them with hospital methods, they are more easily persuaded to enter hospital when necessary. Such an extended service will have a preventive value, for it will be possible to treat many of the crippling conditions of old age at a stage when they are still remediable. Sheldon[5] has already referred to the prevalence of painful feet among the aged and has urged the need for a full service of chiropody. It is important that the home–hospital service should be under the supervision of a senior member of the hospital staff. Under the National Health Service and National Assistance Acts some forms of assistance for the aged are already, and more in time will be, offered by local health authorities—for instance, home helps, home nursing, and district visiting—and it is essential that the responsible member of the hospital staff should work in the closest co-operation with the health department of the local authority. In fact it might be advisable for a joint appointment to be made. Voluntary organizations, also, do very useful work, including visiting and the administration of clubs, libraries, and "meals on wheels" (though these services can be provided also by the local authority), and it is for the hospital to see that the appropriate help reaches the patient in his home.

The employment of the elderly raises a more difficult problem. Although the Nuffield surveyors found that the elderly who continued in employment during the war worked well and needed little special consideration, it is not always easy to find suitable employment for an elderly worker who has already retired or for one who has suffered a disabling illness. That occupation is beneficial to most elderly persons can be seen by visiting any of the few "chronic sick" hospitals that have opened an occupational therapy department, where the satisfaction of the septuagenarians and octogenarians in their work is obvious. Some employers are considering this problem, and research is being undertaken to discover what occupations are suitable for the elderly and what are the economic possibilities of their employment. It is now well recognized that the expectation of life has greatly increased during the past 50 years, that ageing in itself should be a simple painless process, and that the aged possess great powers of recuperation. It is to be hoped that the nation will accept the challenge and will ensure that the extra years that have been given to man shall not be years of misery, frustration, and boredom.

THE BRAIN WAVES OF MURDERERS

At a time when a Royal Commission is hearing evidence on the subject of capital punishment it is painful to reflect upon the lack of hard scientific evidence about the mental health of murderers. The effects of this are apparent throughout the legal proceedings. So long as the jury decides the question of criminal responsibility, it must have simple criteria to apply; the M'Naghten Rules, though in a strict sense old fashioned and even irrelevant, are quite suitable for deciding whether a prisoner should go to prison or to Broadmoor. It is generally recognized, however, that in capital cases the Rules, though applied with a wise elasticity, cannot alone satisfy the demands of justice but must be supplemented in many cases by a medical inquiry after trial. Here another rule of much greater antiquity applies—that no person judged insane by the best contemporary opinion shall be hanged, whether responsible or not. Doubtless notice is also taken at these inquiries of psychiatric evidence which has a bearing on culpability. In the last eight years 7.4% of convicted male murderers have been found insane in this way, and a further 7.4% reprieved partly or wholly on medical grounds.

Evidence of past behaviour and personality, on which psychiatric diagnosis largely depends, must often be incomplete or doubtful, and the prisoner's statement difficult to interpret. The value of electroencephalographic investigation of prisoners facing charges of murder has recently been discussed by Drs. D. Stafford-Clark and F. H. Taylor.[1] They examined 64 such prisoners, 58 men and 6 women, but in 15 cases the charges were reduced to manslaughter and three were found not guilty. Fourteen of the 64 were executed, and 15 were found guilty but insane, either on arraignment, at trial, or subsequently at a statutory inquiry. Five of the insane group were epileptics, but the E.E.G. showed the specific discharges of epilepsy in three other prisoners. One of these was executed, in one the charge

[1] *J. Neurol. Neurosurg. Psychiat.*, 1949, **12**, 325.
[2] *Arch. Neurol. Psychiat., Chicago*, 1943, **50**, 18.
[3] *Trans. Amer. neurol. Ass.*, 1942, **68**, 87.

was reduced to manslaughter, and one was reprieved after sentence had been passed. Seven further cases with severe but unspecific abnormalities in the E.E.G. of the type indicating generalized cortical dysfunction were found. It is of interest that none of these prisoners was executed. Two were found insane, one on arraignment and one at trial; one was guilty but reprieved; two had their charges reduced to manslaughter; and one was guilty but too young for execution. Mild unspecific abnormalities were found in the E.E.G.s of 17 of the remaining prisoners. These abnormalities were of the type found in about 10% of the population, are commoner in neuropsychiatric patients—particularly among those with psychopathic personalities—and are generally regarded as evidence of "immaturity" or defect at high levels of the nervous system. In the United States Silverman[2] reported E.E.G. abnormalities in 26.7% of the ordinary prison population, and Gibbs and his colleagues[3] examined a group of 100 unselected criminals and found abnormalities in 34%.

Having access to all the material evidence and clinical data available, Stafford-Clark and Taylor divided the 64 crimes into five groups. Groups 1 (11 cases) and 2 (16 cases) were the incidental killings (e.g., self-defence) and the clearly motivated murders (including murder during robbery); group 3 (15 cases) included the apparently motiveless murders and those with very slight motive; group 4 included eight cases in which the sexual element was very strong (e.g., rape); and group 5 consisted of the insane, of whom there were 14. The incidence of E.E.G. abnormality in groups 1 and 2, 10% and 25% respectively, contrasts with the 73% in group 3, the apparently motiveless murderers, and with 86% for the insane group. As the authors point out, the cases of inadequately motivated murder appear to present a new medical problem calling for investigation, particularly since many of the prisoners in this group were normal, both from their histories and on examination. It is interesting to note that only two of these prisoners were executed. The proportion of mentally abnormal prisoners is always high. Among 301 known murderers of victims over 1 year of age in 1946–8, 36% were insane and a further 35% committed suicide before arrest. This E.E.G. survey suggests that a further proportion of clinically sane murderers suffer from abnormality of the brain whose significance in terms of culpability cannot at present be accurately assessed.

The disposal of a criminal must ultimately depend on a compromise—sometimes an uneasy one—between legal, psychiatric, administrative, and public opinion. In the case of the murderer, for whom the results of this compromise mean life or death, the responsibility of those who have to make a decision is very great. In such matters psychiatric advice must clearly be given only on the basis of firmly established knowledge. The legal definition of irresponsibility on the ground of insanity is laid down in the M'Naghten Rules. Many lawyers believe that there is a medical definition of insanity. This is not the case; in fact there is no such medical condition as "insanity." A patient may be detained upon a certificate indicating that he is "of unsound mind" not because he is suffering from schizophrenia, paranoia, or other psychosis, but to protect the public from injury, to protect the patient from self-injury or from injury from want of care, or finally to ensure that he will obtain such treatment which he is deemed in need of and which he cannot otherwise receive. The problem lies in the fact that the legal definition of insanity is one thing, and the abnormalities of personality which psychiatrists consider often relevant to crime are another thing, never defined in relation to responsibility—a word not found in the psychiatrists' vocabulary. Yet evidence is accumulating that little-known physiological and psychological factors probably sway the judgment and action of some criminals. If it appears that the psychiatric view of society tends to undermine traditional ideas about individual responsibility, it can be said in its defence that it does so only by stressing the increased responsibility of the more fortunate for the mentally disturbed.

PATHWAYS IN PERIPHERAL NERVES

The only neural element which establishes an unbroken connexion between the periphery and the spinal cord is thought to be the axis cylinder, and the conclusion reached from the classical studies on methods by which certain viruses (for example, poliomyelitis and rabies) and tetanus toxin arrive at the spinal cord was that the axis cylinder formed the pathway. However, as long ago as 1875 Key and Retzius[1] showed that an intraneural injection would sometimes reach the spinal cord, and now Brierley and Field[2] have clearly shown in experiments on rabbits that a radioactive phosphorus solution (P^{32}) may flow quickly from peripheral nerve to spinal cord and even up the spinal cord to the brain. In the cases in which a local swelling was observed after injection of the solution into the sciatic nerve there was a quick rise in the amount of P^{32} in the blood (maximum five minutes), but no notable change in the cerebrospinal fluid or spinal cord. In other cases, however, an intraneural injection caused no swelling at the site of injection and was seen to pass very rapidly up the nerve. The amount of P^{32} in the blood of these animals rose little, while high concentrations were found not only in the C.S.F. but also in the spinal cord and even in the basal ganglia of the brain. Of special interest was the finding in some experiments of high concentrations of P^{32} in the spinal cord, while the amount in the C.S.F. remained low; there were also some surprising increases in the opposite sciatic nerve. It was concluded that when an injected solution passes quickly up the nerve to the spinal cord it does so because it enters a naturally existing space or pathway. Investigation of the route seems to indicate that the P^{32} was injected into a nerve fasciculus and spread upwards along interfibre spaces. These important observations redirect attention to the possible part played by the peripheral nerve in the spread of diseases affecting the spinal cord, such as poliomyelitis, acute transverse myelitis, and tetanus. They should also revive interest in the treatment of such painful conditions as sciatica by the intraneural injection of a nerve.

Dr. Leslie Haden Guest, who was raised to the peerage in the New Year Honours, has assumed the title of Baron Haden-Guest of Saling in the County of Essex.

[1] *Studien in der Anatomie des Nervensystems und des Bindegewebes*, 1875. Stockholm.
[2] *J. Neurol. Neurosurg. Psychiat.*, 1949, **12**, 86.

REFRESHER COURSE FOR GENERAL PRACTITIONERS

BRONCHOPNEUMONIA IN INFANCY

BY

WILFRID GAISFORD, M.D., F.R.C.P.

Professor of Child Health, Manchester University

The introduction of the sulphonamides cannot be said to have revolutionized the treatment and prognosis of bronchopneumonia in infancy in the way it has affected lobar pneumonia. It is true that the outlook has been materially improved both by sulphonamides and penicillin, but bronchopneumonia is still a serious condition and warrants a guarded prognosis, particularly when it is secondary to measles or whooping-cough. It is important never to forget that our real aim should be to treat infants with bronchopneumonia and not bronchopneumonia in infants; the infant is so much more important than his lungs.

Diagnosis

The stethoscope plays but a small part in the diagnosis or prognosis of bronchopneumonia in infancy. It is the eye which determines the diagnosis—and the prognosis also. The decubitus, the facies, the cyanotic tinge, the working of the alae nasi and the other accessory muscles of respiration—these are the clues, and beside them the auscultatory findings are almost insignificant. If, with treatment, the infant's general condition improves and he becomes brighter, if he can smile and take his feeds, what does it matter whether bronchial breathing or rales persist in his chest or his temperature has still not fallen below 100° F. (37.8° C.)? If his general state is satisfactory his lungs may be left to look after themselves. This is of great importance when treatment is being considered, for there is still a tendency to continue chemotherapy as long as physical signs are present or there is pyrexia, irrespective of the general condition, and this may give rise to serious toxic complications.

Aetiology

The frequency of cystic fibrosis of the pancreas as a cause of recurring bronchopneumonia is being increasingly recognized, at least in hospital practice. It is well to bear this condition in mind, for the coeliac picture with fatty stools and distended abdomen may not appear till later—or, indeed, may not appear at all. Any infant with repeated attacks of bronchopneumonia should therefore be sent to hospital for investigation. Often more than one child in a family is affected, and a common misdiagnosis is that of tuberculosis. The clinical differentiation between these two conditions may be extremely difficult unless a Mantoux test is done and proves negative.

Differential Diagnosis

Atelectasis.—In the newborn period atelectasis is common and can rarely be differentiated with certainty from bronchopneumonia; in fact, they are often combined. Aspiration of amniotic fluid or of milk is the usual cause, particularly in premature infants.

Inanition Fever.—There is another condition occurring at this age-period which particularly needs to be recognized. That is dehydration fever, or inanition fever, for it may mimic bronchopneumonia very closely, and intensive treatment directed to the supposed bronchopneumonia may well lead to death. An infant aged 3 or 4 days suddenly develops high fever, grunting respirations and cyanosis, and appears extremely ill. Signs in the chest are notoriously difficult to elicit clearly at this age, and the unwary may well think it advisable to play for safety and assume the presence of a bronchopneumonia and treat it accordingly. Sulphonamides or penicillin, or both, are prescribed, and probably added warmth is provided in the cot. As the temperature does not subside therapy is applied with increased vigour and the condition deteriorates rapidly. All that is required for treatment is water; chemotherapy is certainly contraindicated. The important diagnostic points are: first, to bear in mind that there is such a condition as dehydration fever occurring at this time, and that it occurs especially in big babies; secondly, that the fontanelle is depressed instead of bulging, as it tends to be in septic conditions; thirdly, that evidence of dehydration is present—the mouth is dry and the skin elasticity diminished; and, fourthly, there is always marked loss of weight. Giving water *ad libitum* by mouth, and glucose saline subcutaneously if necessary, will cause an immediate improvement in the condition.

Acidosis.—In later infancy acidosis from alimentary toxicosis may present a differential diagnostic problem, but the type of breathing—the continued, deep, pauseless respiration—is not the same as in bronchopneumonia, and a history of preceding diarrhoea may be elicited.

Meningitis.—This condition, especially the sudden severe meningococcal invasion, is not infrequently mistaken for bronchopneumonia, and lumbar puncture may be necessary before the diagnosis can be determined with certainty.

Treatment

Home or Hospital?—The first thing to decide is whether the infant can be nursed at home or should go to hospital. There is seldom any question in a case of lobar pneumonia in a child, for that can safely be treated at home. In infancy, however, when bronchopneumonia predominates the decision is not so easy. It will depend of course on the home conditions and on the quality of nursing assistance available, but the age of the infant and whether he is breast-fed or weaned must also be considered. The severity of the illness should be taken into account, for oxygen is of the greatest value in the treatment of severe bronchopneumonia, and if it cannot be given in the home admission to hospital should be arranged.

If home treatment is decided upon, there is one important detail to be borne in mind. If possible, every infant who has had bronchopneumonia should have his chest radiographed before being considered "cured." So many cases of bronchiectasis in later childhood date back to an attack of bronchopneumonia with incomplete resolution. The only sure way of diminishing the incidence of this distressing condition is to see that every infant with bronchopneumonia has a radiologically clear chest at the conclusion of his treatment. In cases following whooping-cough or measles this is even more important.

Feeding.—The infant's general condition is the outstanding consideration. His feeds, therefore, play a prominent part in his treatment. They should be small in

volume and given at frequent intervals. If he is breast-fed he may continue, if not too ill. If he was previously on a four-hourly regime, however, it may be wiser to make this three-hourly, as feeding will necessarily be for a shorter time, perhaps only five minutes. If he is breast-fed but too ill to go to the breast the milk should be expressed and given by bottle, spoon, or gavage; if he is artificially fed a similar regime may be used. In any case, extra water may be offered between feeds if the infant is awake and restless or thirsty. The actual caloric intake is of less moment than the total fluid intake.

Hygiene.—Two important prognostic points are the state of the mouth and the state of the abdomen—a dirty mouth or a distended abdomen renders the outlook extremely grave. The oral condition facilitates the aspiration of further bacteria, and a distended abdomen embarrasses the heart, raises the diaphragm, lessens the thoracic capacity, and tends to produce collapse of the lung. Either state is more easily prevented than cured, so that great care should be taken to ensure continual cleanliness of the mouth and to prevent abdominal distension. The earlier the treatment is begun the less likelihood there is of distension. At the first sign an enema should be given, and if this does not bring prompt relief "prostigmin" 0.5 to 1 ml. of a 1:4,000 solution should be given subcutaneously and repeated in three hours if necessary.

The posture to be adopted may be determined by the infant himself. Some are more comfortable when propped up, others when lying flat. There is no "routine position" to be employed in every case. Abundant fresh air night and day, without draughts; loose clothes, both on the infant and on the bed; the avoidance of anything which will tend to embarrass respiration, such as poultices or pneumonia jackets, are all important practical points in nursing.

Drugs.—"Medicines," in the lay sense of the term, play little part in treatment. Expectorants are valueless. Occasionally, if the cough is troublesome and the infant restless, relief may follow a sedative linctus such as

Linctus Scillae Opiatus } āā 5–10 min. (0.3–0.6 ml.)
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according to age, given as often as necessary. "Opening medicine" is contraindicated. If the bowels are constipated a small enema may be given. The risks, in infancy, of causing diarrhoea by giving a purgative are much more serious than allowing constipation to continue. Castor oil should never be given. If an analeptic is necessary, "transpulmin" in doses of 5–7 min. (0.3–0.62 ml.) four-hourly or p.r.n. is perhaps the most valuable cardio-respiratory stimulant.

Chemotherapy

Because of the difficulty of getting sputum from an infant it is seldom practicable to have the infecting organism typed. Therapy must therefore be based to some extent on the presence of the most likely organism, because in severe cases treatment is a matter of urgency and to wait for bacteriological confirmation is to waste valuable time. The pneumococcus becomes the most frequent organism as age advances, but in early infancy the staphylococcus is almost as common, and in the neonatal period *B. coli* is frequently responsible. The first will respond to sulphonamides, the second to penicillin, and the third to streptomycin. *Haemophilus influenzae* is sometimes the causative organism. This responds either to sulphadiazine or to streptomycin, and is best treated by a combination of the two.

Choice of Drug.—A selection of chemotherapeutic agents is thus available. Which to choose? The sulphonamides offer the obvious advantage of being effective by mouth, but they are of little value in staphylococcal infections. If cough is troublesome these drugs are liable to be vomited and the quantity absorbed becomes uncertain. With the newer penicillin products injections need not be given more often than twelve-hourly. If the penicillin depot technique is used, one injection daily of procaine penicillin G in 2% aluminium monostearate in oil may be found sufficient On general principles, therefore, penicillin would seem to be the drug of choice.

Whatever drug is selected, it is most important to give the maximum dose at the earliest possible moment. In lobar pneumonia the whole treatment may be given in one dose with very successful results, but unfortunately in bronchopneumonia this ideal has not yet been reached. It is possible to give the greater part of the treatment in the first twenty-four hours, however, and this should always be the practitioner's aim.

Penicillin.—Penicillin is relatively non-toxic, so that it is better to give too much than too little. At 1 month of age 100,000 units, at 3 months 250,000 units, and 500,000 units at 1 year are adequate doses for severe infections They may be repeated in twelve hours if necessary and continued at the same interval on the second day. If the infecting organism is sensitive this dosage should be sufficient to overcome the infection. The infant's own powers of resistance now come into play and the natural phagocytotic processes will complete the cure. If the infant's general condition improves and continues improving the treatment has been successful and further injections are not necessary, even if his temperature is not absolutely normal. It takes the body three or four days to overcome the infection completely, but it can do this perfectly well without the aid of drugs if the initial dosage has been adequate.

Toxic effects of sulphonamides and antibiotics are seldom seen in this intensive therapy; it is when they are continued that complications arise. Drug fever, for example, which does not occur with this method, may be a cause of trouble if smaller doses have been given over longer periods. Skin rashes are more often encountered if treatment is prolonged, and the organism then has a greater chance of developing resistance to the drug. *H. influenzae*, for instance, may become resistant to streptomycin in a matter of hours.

Sulphonamides—If sulphonamides are used they may well be mixed. Sulphadiazine, sulphamerazine, and sulphathiazole may be given in equal parts, and renal complications are then less likely to arise. It is important to watch for oliguria, which may often pass unnoticed in infancy.

The dose should vary with (1) the age of the infant and (2) the severity of the infection. The more severe the infection the larger will be the dose necessary to overcome it. At 1 month of age 0.25 g. of each of the above sulphonamides, 0.5 g. of each at 3 months, and 0.75 g. of each at 1 year would be adequate as an initial dose and may be repeated in two-thirds of these amounts in twelve hours if indicated. One-third of the initial dose may be given four-hourly thereafter for a further twenty-four or forty-eight hours. It should seldom be necessary to continue treatment after the third day.

Streptomycin.—In the presence of an epidemic of influenza, and when it may be fair to assume that *H. influenzae* is the infecting organism, an infant with bronchopneumonia should be given sulphadiazine in doses of 0.5 g. at 1 month, 1 g. at 3 months, and 1.5 g. at 1 year, together with 100,000–500,000 units of streptomycin as an initial dose,

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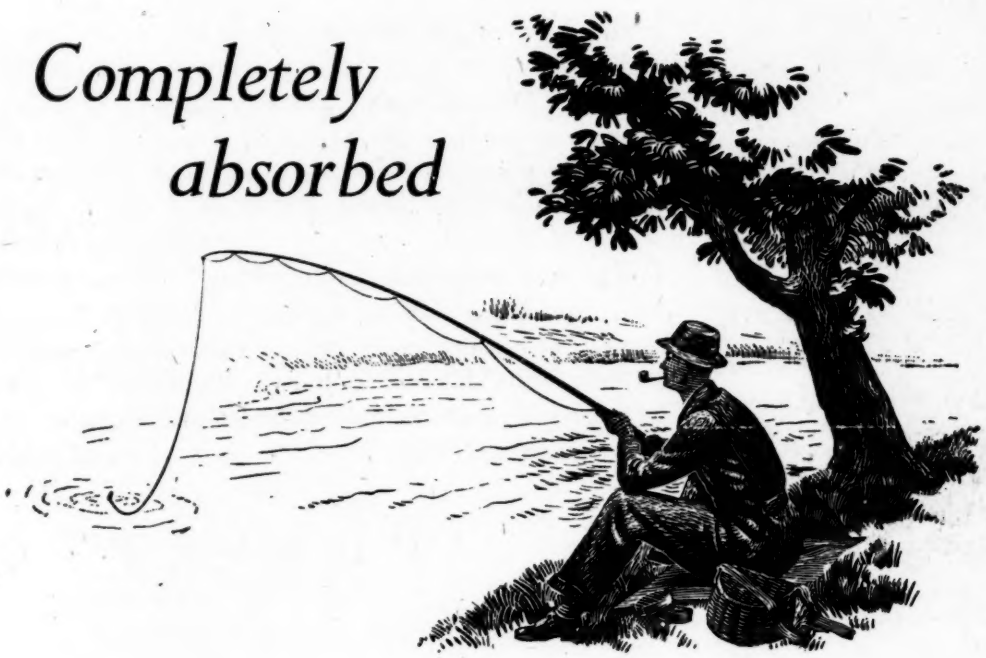

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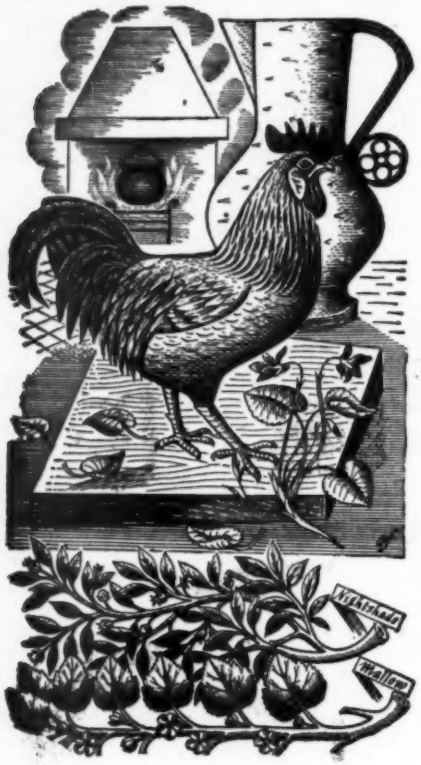

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1540: *"Take a fatte piece of veale or ellse a fatte capon and boyle it in water or ellse white wyne and strayne it from the fleshe, and sett the saide lycor over the fyre agayn, and putt therto these things folowing, of mallowes ii. unces, of violett leaves, of night shade ana ℥ i. lett them boyle untyll they be very softe and tendre, and powre awaye the licor from them and putt therto barley water as shall suffise to make it a pulthes".*

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followed by half this amount of sulphadiazine and one fourth of the amount of streptomycin at four-hourly intervals until improvement occurs. For the treatment of infection in the newborn, streptomycin is probably the drug of choice. An initial dose of 50,000 units (for a seven-pound (3-kg.) infant) may be followed by 25,000 units four-hourly. Improvement should be noticed within twenty-four hours, and the length of time that treatment should be continued after this will depend on the response and condition of the patient.

Aureomycin.—Further experience with aureomycin will probably lead to its inclusion in the group of chemotherapeutic drugs of particular value in the treatment of bronchopneumonia in infancy. Recent reports suggest that it is also of use in the prevention of the pulmonary complications of cystic fibrosis of the pancreas.

A routine course of treatment should not be prescribed. Each case varies, and dosage and frequency of treatment must be changed with the individual infant according to the severity of the infection, his reaction to it, and his response to treatment. A course of tablets or injections to be given four-hourly, irrespective of the response, is not a correct procedure. Any infant ill with bronchopneumonia should be seen at least once a day until he is judged to be out of danger. Any change of therapy or dosage may then be considered and put into effect till the next visit.

Complications.—A daily examination will also bring to light at the earliest moment any complication that may have arisen. Empyema or lung abscess may occur, though both are much rarer since the introduction of chemotherapy. The changes in the infant's general condition and in the physical signs in the chest are usually obvious. Acute otitis is less uncommon and should be borne in mind if the temperature rises a few days after the conclusion of the treatment. Apart from the temperature the only signs indicating this condition may be vomiting and diarrhoea, and their occurrence should immediately lead to an examination of the ears.

CAPITAL PUNISHMENT

THE B.M.A.'s EVIDENCE

The British Medical Association submitted evidence orally and in a memorandum on February 3 to the Royal Commission on Capital Punishment. The memorandum, which has been approved by the Council of the B.M.A., was prepared by a special committee appointed by the Council and comprising the following members: Dr. R. G. Gordon (chairman), Dr. E. A. Gregg, Sir Cyril Burt, Dr. Denis C. Carroll, Mr. Neville Faulks (barrister-at-law), Dr. J. A. Gorsky, Dr. T. Rowland Hill, Dr. H. L. Glyn Hughes, Dr. W. G. Masefield, Dr. Doris M. Odlum, Dr. W. W. Sargant, Sir Sydney A. Smith, Dr. E. B. Strauss, and Dr. J. G. Thwaites. The following evidence was given in the memorandum, which is summarized here.

The M'Naghten Rules

According to the M'Naghten Rules, to establish a defence on the ground of insanity in a criminal case, "it must be clearly proved that, at the time of the committing of the act, the party accused was labouring under such a defect of reason, from disease of the mind, as not to know the nature and quality of the act he was doing, or, if he did know it, that he did not know he was doing what was wrong."

This formula has often been attacked on the ground that it takes account only of the cognitive faculties and is therefore based on an antiquated and outworn conception of mental disease. Instead of criticizing the M'Naghten Rules as embodying a conception of insanity which is obsolete, the Association prefers to criticize them as embodying a conception of irresponsibility which, in the light of modern psychological knowledge, must be regarded as incomplete.

There are two arguments proposed by those who would retain the Rules in their present form. In the first place, it is suggested that they are not hard-and-fast rules which cannot in any way be extended in their application. This argument was used by the Lord Chancellor, Viscount Haldane, in the debate on the Criminal Responsibility (Trials) Bill, introduced in the House of Lords by Lord Darling in 1924. "I have never heard," he said, "of these rules embarrassing any judge who really had a case before him in which justice required an acquittal, or preventing him from giving such direction to a jury as would enable them to apply these rules in cases where they ought to be applied—in cases, for instance, where the impulse was so dominant as to deprive a person of freedom or of any realization of what he was doing."

It is true that, in varying degrees, judges have departed from the literal interpretation of the M'Naghten formula. An outstanding example is the case of Ronald True (1922), in which Mr. Justice McCardie said in his charge to the jury: "Even if the prisoner knew the physical nature of the act and that it was morally wrong and punishable by law, yet was by mental disease deprived of the power to control his actions, then the verdict should be 'Guilty, but insane.'" The learned judge found no support for this pronouncement when the case went to the Court of Criminal Appeal. There is no doubt that judges differ, and differ widely, in their use of the formula, some applying it rigidly in its literal meaning and others altering the meaning to such an extent that they may be said to ignore the formula rather than to interpret it.

What is open to doubt is whether the elasticity claimed by the Rules is an advantage. The contrary view was expressed by Mr. (later Sir) Fitzjames Stephen in commenting on the evidence given by other witnesses before the Select Committee on the Homicide Law Amendment Bill, 1874:

> "Baron Bramwell thinks that the law of England is such that insanity hardly ever, under any circumstances, excuses a man from crime. . . . Mr. Justice Blackburn says, on the other hand, that the section drawn in the Bill pretty nearly represents the existing law as it is, and, if it errs, it errs in defect, because it does not take in certain cases which ought to be taken in He adds that, in a particular case which he had to try, thinking that the existing law was, I suppose, in a very elastic condition, he took upon himself to tell the jury that there were exceptional cases which came under no rule, and that they ought to acquit the woman who was on her trial on the ground of insanity, although no authority could be found for it and although Baron Bramwell, an equal authority, considers that the woman under such circumstances ought not to be acquitted, as it was perfectly certain she was by law guilty. . . . When you find two learned judges of the highest eminence directly contradicting each other on matters of first importance, matters on which the life and death of persons tried before them might depend, and one of them praising that state of things as a proof of the elasticity of the common law, I can only say that I feel surprised, and cannot agree with that learned judge's praise of its elasticity."

The second argument advanced in opposition to any proposal to revise the M'Naghten Rules is that, when the Rules fail to exonerate a person who ought not to be held responsible to the law, the position is rectified by the statutory inquiry subsequently ordered by the Home Secretary, so that no injustice results. This argument seems to imply the view that it is just to condemn an accused person to death although the prisoner may be the only person in the court to whom it is not evident that the sentence will never be carried out.

Inexactitude of Rules

In neither of these arguments is it claimed that the M'Naghten Rules constitute an exact and unequivocal and complete statement of the conditions of criminal irresponsibility. In the first case the inexactness of the Rules is acknowledged, the claim being that, by reason of their inexactness, the judge can extend their application at his discretion to meet the circumstances of the individual case. The second argument frankly admits the imperfections of the Rules and claims merely that the resulting errors are subsequently rectified outside the court.

The Association believes that the Rules are incomplete, since there are persons charged with murder, and pleading insanity, who in all probability ought to be held to be irresponsible despite their awareness of the nature and wrongfulness of their acts. And even within the limited field in which the Rules are applicable there are persons who should be judged irresponsible but whom the Rules will not exonerate unless they are given a wider meaning than that authoritatively assigned to them by the Court of Criminal Appeal.

The first question is the meaning of "disease of the mind." The Select Committee on Capital Punishment, which reported in 1930, thought that it was desirable to "extend the area of criminal irresponsibility in the case of the mentally defective." It may be that mental disease is commonly understood to include mental defect, but the Association suggests that it should be clearly laid down that "disease of the mind," as used in the definition of irresponsibility, covers incomplete mental development as well as grave disturbances of mental health.

The second question is what precisely is meant by knowing the nature and quality of the act and knowing that the act is wrong. This question was answered in the decision of the Court of Criminal Appeal in the case of *R.* v. *Codere* in 1916. Counsel for the appellant had maintained that "nature" of the act referred to its physical aspect and "quality" to its moral aspect; and that "wrong" was different from and not synonymous with "punishable by or contrary to law." But Lord Chief Justice Reading, in delivering judgment, said:

"The court is of opinion that in using the language 'nature and quality' the judges were only dealing with the physical character of the act, and were not intending to distinguish between the physical and moral aspects of the act. . . . In a case of the kind—namely, killing—it does not seem debatable that the appellant could have thought that the act was not morally wrong, judged by the ordinary standards, when the act is punishable by law and is known by him to be punishable by law. It was suggested at one time in the course of the argument that the question should be judged by the standard of the accused, but it is obvious that this proposition is wholly untenable and would tend to excuse crimes without number and to weaken the law to an alarming degree. It is conceded now that the standard to be applied is whether according to the ordinary standard adopted by reasonable men the act was right or wrong. There may be cases where it is difficult to decide that question, but that is not the case here."

On the other hand, it would appear from evidence given before the Royal Commission (Minutes of Evidence 1–2, Paragraph 614) that in the Scottish courts "the question whether the man recognizes that something is legally punishable is part and parcel of the appreciation of the nature and quality of the act, and the question whether he realizes the act is wrong is a separate issue and refers to his own personal and private judgment of it.

The Association considers that the definition given by Lord Reading is too restrictive. For example, an insane person who clearly knew that his act was punishable by law, but believed that he was called upon by the Deity to commit the act, would be held responsible according to this definition. The Association favours the Scottish interpretation and suggests the desirability of its adoption in the English courts.

But even if the M'Naghten formula were interpreted in accordance with these suggestions, what the Association believes to be its chief defect would remain. While it is not strictly true to suggest that the formula takes account only of impairment of the cognitive functions, since an emotional disturbance may bring an accused person within the definition by preventing him from forming a rational judgment of his act, the Association considers that awareness of the nature and wrongfulness of the act may coexist with a state of emotional disorder, resulting from mental disease, of such a nature that the person so afflicted does not possess sufficient power to prevent himself from committing the act. It therefore wishes to recommend strongly that a "third limb" should be added to the formula to provide for cases of this type.

It may be objected that the jury would be incapable of deciding whether the power to control conduct was absent—of deciding when a person who found control difficult suddenly found control impossible. But the existing question for the jury—as to knowledge of the nature and wrongfulness of the act—is by no means easy, since there are degrees of intellectual impairment just as there are degrees of deficient control. The Association considers that in both cases the decision as to complete irresponsibility is a very difficult decision indeed. Yet the law demands decisions; and the Association suggests that the judgment of twelve jurymen, based on consideration of all the evidence, is as likely to approximate to the truth in the latter case as in the former.

Diminished Responsibility

Apart from the above considerations, the M'Naghten Rules are open to criticism on the ground of over-simplification. They assume the existence of two opposite states of mind—the state of knowing the nature and wrongfulness of the act and the state of not knowing the nature and wrongfulness of the act—and they ignore the gradation of intermediate states between full knowledge and complete lack of knowledge. The Association believes that there are mentally abnormal persons charged with murder who cannot be absolved from all responsibility but whose responsibility should be held to be so reduced, through defect of reason or disorder of emotion resulting from disease of the mind, as to make it undesirable that they should suffer the extreme penalty. This is the Scottish doctrine of "diminished responsibility," which has been defined thus by Lord Justice Clerk Cooper:

"Even if a man charged with murder is not insane, still our law does recognize—although it is only latterly that it has done so—that, if he was suffering from some infirmity or aberration of mind or impairment of intellect to such an extent as not to be fully accountable for his actions, the result is to reduce the quality of his offence in a case like this from murder to culpable homicide."

The Association considers that no revision of the M'Naghten formula can completely solve the problem of determining responsibility for crime unless it is made possible for the defence in the English courts, as in the Scottish courts, to set up, as an alternative to the plea of insanity, a plea of diminished responsibility. This plea should be admissible, and the jury should be directed, if satisfied that the plea has been established, to return a special verdict, such as "Guilty, with diminished responsibility."

Recommended Formula

The Association recommends the adoption of some such formula as the following:

A. To establish a defence on the ground of disease of the mind, the party accused must prove that, at the time of the committing of the act, he was labouring, as a result of disease of the mind, under

(1) a defect of reason such that he did not know (*a*) the nature and quality of the act he was doing; or (if he did know this) (*b*) that he was doing what was wrong; or

(2) a disorder of emotion such that, while appreciating the nature and quality of the act, and that it was wrong, he did not possess sufficient power to prevent himself from committing it.

Note.—"Disease of the mind" covers incomplete mental development as well as grave disturbances of mental health. "Wrong" means, not "punishable by law," but morally wrong in the accused person's own opinion.

B. When a jury find that an accused person, at the time of the committing of the act, was labouring, as a result of disease of the mind, under a defect of reason or a disorder of emotion to such an extent as not to be fully accountable for his actions, they shall return a verdict of "Guilty, with diminished responsibility." (It might be open, in a proper case, to a court of summary jurisdiction to record the finding of this verdict.)

C. In the cases envisaged in A and B above, the same burden of proof shall be upon the accused as upon the plaintiff in a civil action, and in no case shall it be necessary for a court to consider or a judge to direct the jury as to such matters unless one or other has been specifically raised on behalf of the accused.

Other Written Evidence

Methods of Execution.—No medical practitioner should be asked to take part in bringing about the death of a convicted murderer. So

far as it can judge, the B.M.A. considers that hanging is probably as speedy and certain as any other method that could be adopted.

Investigation of Mental Condition.—The Association has examined the suggestion that the court might engage the services of members of a panel of medical experts, who would replace the expert medical witnesses called by the prosecution and the defence. It thinks that justice is best served by the present procedure, provided that the defence has the opportunity of completely investigating the prisoner's state of mind, or of obtaining access to the results of such an investigation. Sufficient time must be made available for investigation, and if there is any financial obstacle to the prisoner's engaging expert medical witnesses the services of such witnesses should be available free, and their cost met from public funds. Whatever the financial position of the prisoner, the defence must have full facilities for carrying out every scientific investigation proved significant and reliable by modern research—for example, electroencephalography.

Research.—Intensive research should be undertaken into methods of investigating responsibility for crime, and it would be necessary for the research to be specially endowed

"Guilty, but Insane."—This verdict seems to be illogical, and the B.M.A. supports the recommendation of the Committee on Insanity and Crime (1923) that the verdict should be that the accused "did the act (or made the omission) charged, but is not guilty on the ground that he was insane so as not to be responsible, according to law, at the time."

Treatment.—A special type of institution should be established for appropriate cases where treatment may be carried out.

Publicity.—The B.M.A. deplores the sensationalism of certain sections of the Press in reporting murder trials and execution scenes and its possible effect on certain unstable and sensation-loving persons. It would be preferable not to announce the date of execution in advance and not to post a notice of execution at the prison gate.

ORAL EVIDENCE

The oral evidence was given by Dr. R. G. Gordon, Dr. T. Rowland Hill, Dr. E. B. Strauss, and Mr. Neville Faulks, barrister-at-law.

Criminal Responsibility in Murder Cases

Sir Ernest Gowers, chairman of the Commission, began by asking what were the outstanding differences from the medical point of view between the earlier and the present conception of insanity in criminal cases. Dr. Gordon replied that a hundred years ago only the cognitive and intellectual aspects of the mind were considered; nowadays the influence of emotion in explaining behaviour was much more clearly recognized.

The next question asked was on the validity of the present definition. Dr. Gordon replied that in the first place it would be difficult to get medical practitioners to agree on a precise definition of insanity, and in the second place the profession were not really responsible—and did not want to put themselves in the position of being responsible—for saying what should be done with a man who had committed murder. It could not even be said that because on medical grounds a person might be judged to be insane he was therefore totally irresponsible for his actions. Not all persons certified as insane could be held to be entirely irresponsible.

The chairman asked whether it was argued that a man who was temporarily insane might nevertheless in some degree be responsible for his acts. Dr. Rowland Hill replied that the point was that medical certification of a person as insane was purely a practical measure. It was not the certification of insanity, but the disease itself, which determined the degree of responsibility. Certification was a practical thing which might depend upon domestic circumstances and other considerations. A man was not confined in a mental hospital wholly on medical evidence. The laity in the person of a justice of the peace required to be satisfied that confinement was necessary. Doctors must frame their certificates in language such as satisfied the layman. It had never been claimed that a medical man's opinion alone, without the authority of a lay body, should determine the issue of responsibility.

The chairman asked whether they would say that it should be left to the jury to decide whether a man was sane. Dr. Rowland Hill replied that, granted that the defence had equal opportunity with the prosecution, and could produce medical support for unfitness to plead, he thought the matter should be left to the court.

The M'Naghten Rules

The witnesses were asked for their opinion concerning the M'Naghten Rules. Dr. Rowland Hill said that in preparing their evidence they had sought to avoid the position in which the rules might be expanded to meet some cases and contracted to meet others. They had desired to extend and modernize the rules.

The chairman: You agree that the statutory inquiry is necessary?

Dr. Rowland Hill: Certainly.

The chairman: But otherwise you agree that as far as possible the matter should be left to the jury?

Dr. Rowland Hill: Yes.

The chairman: And the M'Naghten Rules as you propose to amend them will have the effect that you desire?

Dr. Gordon: That is our view. We wanted to suggest to you a means whereby the great mass of these cases could be covered.

In further examination on the question of criminal responsibility, Dr. Gordon said that he felt strongly that there were people who did know the nature of their acts and knew that what they did was wrong, but nevertheless could not be held responsible for their acts.

Dr. Rowland Hill said that in his experience of trials the M'Naghten Rules as they stood at present were incomplete. He had in mind cases where there was a great deal of sympathy for the accused—there was a recent case in which under conditions of great provocation a young man had killed his father, and he felt that that case was not covered in the present state of the law.

The chairman asked what exact meaning was attached to "disease of the mind." Dr. Rowland Hill said that they wanted it interpreted in the widest possible way, to cover all mental deficiency and abnormality. The chairman said that when the Director of Public Prosecutions gave evidence he said that there were only about two conditions, compulsion neurosis being one, which deprived a man of responsibility. Dr. Rowland Hill said that there were many conditions in which conduct was described as being due to irresistible impulse; he would be inclined to group under the heading of such conditions the various manifestations of aggressive psychopathic disorder—one of the most serious causes of criminal conduct, and one which might be associated with quite good intelligence. Certain forms of disease of the brain caused emotional changes which often manifested themselves in conduct. Temperaments sometimes changed after a serious head injury, as was often seen in the late war. Uncontrollable temper might develop, with a general state of restlessness and impulsiveness. There were well-known behaviour disorders during sleeping sickness. Infections in children and young adults sometimes led to impulsive behaviour which brought them in conflict with the law. Compulsion neurosis was one of the manifestations of psychoneuroses which did not produce a fundamental destruction of personality or certifiable damage to intelligence but which might cause the person to commit aggressive acts. There were, of course, compulsory neuroses which were not associated with the aggressive type of impulse.

Dr. Strauss said that the sufferer from compulsion neurosis might be fully aware of what he was doing, and yet his acts lay outside his will. Only the previous day he had seen a patient who had thrown a knife at his sister and had tried to stab his wife. This man quite certainly had his brain damaged during the war. He was fully aware of the nature of his acts, and that they were morally wrong and called for punishment, yet it could be said with confidence that he was not responsible. It was not fully realized also that various states of the body could, directly or indirectly, affect the condition of the mind. Variation in blood-sugar content might have a direct bearing on conduct. He knew of a case in which strong impulses occurred only when the blood sugar sank below a certain level. Each case must be considered on its facts.

The chairman said that in a sense this was dangerous doctrine. There were two dangers: one that the situation might be interpreted too leniently by emotional members of the jury, and the other that it might give rise to widely different verdicts in similar cases. Dr. Rowland Hill thought that the jury should be able to understand the case if it was put clearly.

The Recommended Formula

Dr. Rowland Hill said that the B.M.A.'s formula was an attempt to set out in non-technical phraseology one aspect of mental disease. Formerly the human mind was regarded as a thinking and calculating machine, but the emotional side of human nature called for incorporation in such a formula. It was an endeavour to make the M'Naghten Rules consistent with the present state of psychiatric knowledge. The chairman said that one legal authority who had given evidence had suggested the words, "Did not know the nature and quality of his act." Dr. Rowland Hill said that he did not think there was any objection to those words, but the Association was not out to suggest particular phrases.

The chairman said that in the memorandum five abnormal mental states were mentioned—namely, (1) aggressive psychopathic states, (2) states associated with organic damage to the brain (epilepsy, epidemic encephalitis), (3) depressive states with desire for self-destruction or self-punishment, (4) early schizophrenia, and (5) paranoia and paraphrenia. He asked the witnesses to give illustrative examples.

(1) Dr. Rowland Hill mentioned the case of a typical aggressive psychopath who had been convicted and imprisoned over and over again. He was fully intelligent, and when asked what he was being punished for replied, "Grievous bodily harm." That type of case could be quoted frequently.

(2) Dr. Strauss mentioned the case of an agricultural labourer aged 18 who had committed murder. No signs of abnormality were observed whilst he was in prison, and he was generally co-operative and reasonably intelligent, yet there was much to suggest that he had organic damage to the brain, with potentialities of epilepsy, and close inquiry revealed that he had "black-outs." This boy was most unwilling for his counsel to plead insanity, but three-quarters of the way through the trial his counsel switched over from a plea of "Not guilty" to one of "Guilty, but insane," and he was sent to Broadmoor.

(3) As an example of depressive states, Dr. Gordon quoted the case of a woman, known to have self-destructive tendencies, who attempted to drown herself and her mentally deficient daughter in a canal. She left a note saying that she knew that what she was doing was wrong, but there was no other course. The judge expressly said in that case that it could not be covered by the M'Naghten Rules.

(4) Dr. Rowland Hill cited a case of early schizophrenia—an intelligent young man who had committed murder and was diagnosed as having this disease. Here again the view was expressed by an experienced medical officer that the M'Naghten Rules did not apply.

(5) Dr. Gordon described a case of paranoia—a condition in which people imagined that others were "down" on them. This was a well-known solicitor conducting a successful business who thought that certain members of his profession were plotting against him. One night in a cinema he suddenly pulled out a revolver and tried to shoot two people sitting behind him, but unfortunately the shots went astray. Intellectually he was not seriously affected except for his fixed idea.

Sir William Jones, a member of the Commission, said that it was sometimes suggested that all murderers were mentally affected. Dr. Gordon agreed that there was a general feeling that a murderer must be mentally abnormal, though he did not know that it could be proved.

"Diminished Responsibility"

In reply to a question by another member on the Scottish doctrine of "diminished responsibility," Dr. Rowland Hill said that they supported that conception. There was no sharp line of demarcation between mental health and disease. Serious forms of insanity were, after all, exaggerations of normal traits. It was because of this that words like "schizoid" and "paranoid" were coined to describe tendencies which were not fully schizophrenia or paranoia. The M'Naghten Rules were not adequate because they allowed no borderline.

Dr. Gordon said that on the whole they felt it was better that the jury should be apprised of all the facts. Asked if the jury's decision would be final, Dr. Rowland Hill said that it would be no more final than it was now. All that would happen would be that the judge would direct the jury's attention to a wider field.

Mr. Radzinowicz, another member of the Commission, asked when the British Medical Association was established, and, on being told 1832, commented that it must have shifted its position on this matter of criminal responsibility. Dr. Rowland Hill replied that its recommendations had advanced with the advance of science.

The same member pointed out that, while insane persons were a relatively small class, mental defectives were a very large and ill-defined class, and to bring these into the recommended formula (for it was stated that "disease of the mind" covered incomplete mental development as well as grave disturbances of mental health) seemed to open a very wide door. Were all anti-social acts of the mental defective, which might not be against the person at all, but against property, to be brought into this category? Dr. Rowland Hill replied that for a total assessment of responsibility on medical grounds the level of the intelligence would have to be taken into consideration. Dr. Gordon added that each case would have to be considered on the evidence, and it would be necessary to satisfy the jury that the degree of mental disease or defect was such as to remove responsibility.

Asked how many executions would not have taken place had the recommended formula of the British Medical Association been in operation, Dr. Strauss said that he could give no figure, not having surveyed the whole field. But he was sure that in the recent case of Raven the murderer would not have been condemned to death or at least his execution would have been stayed.

Methods of Execution

Questioned by the chairman on the section of the memorandum relating to methods of execution, Dr. Gordon explained the practical difficulties of making an intravenous injection of a lethal dose of a narcotic drug as an alternative to hanging. It was easy enough to give an intravenous injection to a willing patient, but if there was not co-operation on the part of the subject it would be very difficult to carry out. The slightest struggle would displace the needle. The Association, however, was most emphatic in its objection to any method of execution which compelled the services of the medical practitioner, either as principal or accessory.

The chairman asked whether intravenous injection must necessarily be carried out by a medical man.

Dr. Rowland Hill replied that some people took injections quite easily and others with extreme difficulty.

The chairman also said that cases had been heard of in which, owing to malformation of some kind, it was impossible to carry out hanging, and, as hanging was the only means of execution at present, these people were reprieved. What about the gas chamber? Dr. Gordon said that from the point of view of humanity the gas chamber would be at least as terrifying as the scaffold. It would be necessary for attendants wearing gas masks to accompany the condemned man into the chamber, and the surroundings of an execution would be at least as forbidding as now. He considered that hanging was probably as speedy and certain as any other method. He agreed that doctors in suitable cases at their own discretion might give some kind of sedative. The objection was to any regulation compelling a medical officer to be a participant in the actual process of killing.

Concerning the investigation of the mental condition of murderers, Dr. Rowland Hill said that it was considered that the present procedure of the courts was satisfactory, provided that the defence had an opportunity of carrying out a complete investigation of the prisoner's state of mind. The suggestion that the court might engage a panel of medical experts did not seem to offer much improvement on the present procedure. Dr. Gordon thought that sometimes the courts did not get the whole story, and that was why the Association had laid such stress on the need for a complete investigation of the prisoner's state of mind being available for the defence. Dr. Rowland Hill thought that the prisoner should be under the observation of a full-time medical officer, and access should be given for any other medical examinations considered necessary. In his experience it had sometimes happened that the only medical man giving evidence for the prosecution in a murder trial was a part-time prison officer, perhaps a general practitioner who visited the prison only occasionally. He also mentioned that

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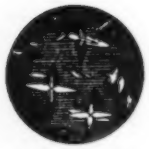

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financial provision for the defence was often extremely meagre, and medical witnesses had purely nominal fees.

On a suggestion that there might be a special type of penal institution for therapy—an institution intermediate between the ordinary prison and the mental hospital—Dr. Rowland Hill said that there was no reason why persons guilty but with diminished responsibility who were suffering from mental conditions amenable to treatment should not have their lot mitigated, so that, within the necessary confinement, they could lead a life of some activity. There was no point in rigorous conditions for psychopaths; it was merely detention that had to be ensured.

The effect of capital punishment on other persons was also mentioned. Dr. Gordon urged the discontinuance of the notice on the prison gate. It gave rise to a good deal of morbid feeling, and should go the way of the black flag.

Finally, the witnesses suggested a scientific inquiry into the deterrent value of punishment. Such a scientific inquiry would include a study of penal methods in other countries.

RADIUM, RADON, AND RADIOACTIVE ISOTOPES

The Minister of Health has been considering the arrangements for supplying radium, radon, and radioactive isotopes to hospitals in the National Health Service in the light of the dissolution of the National Radium Trust and the National Radium Commission and the establishment by the Ministry of Supply of the Radiochemical Centre at Amersham. Because of the special dangers and difficulties associated with radiotherapy, the Radium Commission exercised a comparatively close control over the distribution and handling of radioactive substances used for treatment. For the same reasons the Minister regards it as necessary to continue a central control of a similar character. The Ministry has sent instructions on this (here abridged) to hospital boards and committees.

The importance of joint planning for the treatment of cancer by regional hospital boards and boards of governors has previously been emphasized. The action indicated in the following paragraphs should be taken by boards only after consultation with the joint committees.

Radium

Supply of New Radium

All new radium supplied to hospitals will be provided by the Radiochemical Centre on hire to the board of governors or hospital management committee. Boards of governors should send their applications for radium to the Ministry of Health, not direct to the Radiochemical Centre. Hospital management committees should send their applications to the regional board, who are asked to forward them to the Ministry with a recommendation either in support of or against the proposals. A list of the standard types of containers most easily made available appears below. This list was prepared by a technical committee of the Radium Commission. Containers other than these standard types will be supplied as necessary, but where an application for a non-standard container is made it should indicate why this is specially necessary.

After examination of orders submitted by boards the Ministry of Health will ask the centre to deliver the container or appliance, and the centre will send to the board or committee for completion a form of agreement prepared in consultation between this Ministry and the Ministry of Supply. Hire charges for containers or appliances will be based on the radium content at the rate of £225 per gramme per annum. This hire charge and the cost of fabrication necessary will be paid by the board of governors or management committee concerned. Hire charges and the cost of fabrication will have to be paid also for all containers or appliances supplied by the Radiochemical Centre between the appointed day and the present time. The Ministry of Health will pay the charges for which accounts have been rendered to the Ministry up to the date of issue of this memorandum, and appropriate accounting instructions will be sent to the boards of governors and the hospital management committees concerned at a later date. If boards or committees have not made provision in their 1950–1 estimates sufficient to cover the cost of the provision of radium and radon these charges should be taken into account when they prepare revised estimates next autumn.

Hospitals which have in the past had radium on loan from the Radium Commission undertook to keep full records, including follow-up, of cases and at the end of each period of twelve months to report to the Commission through the faculty of medicine of the university on the radium work at the hospital. These records and reports were found in practice to be of considerable value to the hospitals themselves in that they enabled the Commission—whose functions in this respect will now be performed by the Minister and his consultant advisers—to disseminate developments of knowledge and to advise hospitals and individual clinicians on particular problems. The Minister hopes, therefore, that all hospitals where radiotherapy is carried out will in future prepare, or continue to prepare, such reports and send them in to him at the end of each year. The Minister has already asked boards to adopt, as opportunity occurs, the records system started by the National Radium Commission and now operated by the General Register Office.

In order that the Ministry of Supply may make appropriate arrangements to meet hospitals' requirements, an estimate of the annual requirements of each board will be needed well in advance. For the next financial year an estimate should be submitted by boards to the Ministry of Health not later than February 28, 1950, and should relate to the period April 1, 1950, to March 31, 1951.

Existing Stocks of Radium

The Ministry of Supply has agreed to purchase all radium at hospitals or in store now owned by the Minister of Health. This is an administrative arrangement intended to overcome the difficulties which arise in handling and processing radium in more than one ownership, and will in no way affect the availability, location, or use of the radium in the hospital service. A hiring agreement will afterwards be entered into between the Ministry of Supply and the boards of governors and management committees.

In order that the Ministry may have adequate records of the stocks of radium held at hospitals, boards of governors and hospital management committees are asked to send to the Ministry of Health, not later than February 28, all radium certificates in their possession, together with two copies of a record indicating for each of their hospitals:

(*a*) the quantity of radium and nature of the appliance known to coincide with the official measurement certificates;

(*b*) the quantity of radium which is either uncertified (the type of appliance or container should be shown) or for which the certificates are thought to be inaccurate—e.g., by reason of repairs having been carried out on the appliances;

(*c*) of this total the quantity of radium no longer required by the hospital and therefore available for disposal.

The record should include *all* radium in hospitals and should indicate whether the radium is the property of the Minister or on hire or loan, and the hiring charge being paid. It would be helpful for the checking of records if Radium Commission radium could be shown as such, although it is now the property of the Minister. A *nil* return should be submitted in respect of hospitals which have no radium, and hospital management committees should send a copy of all returns submitted to the Minister to the regional hospital board. The radium certificates or copies will be returned after examination.

Repair of Radium Containers

Containers of the standard types set out below which require repair should be sent by hospitals to the Radiochemical Centre, White Lion Road, Amersham, Buckinghamshire, and payment for this work should be made by the board or committee concerned. If the repairs involve a change in the type of container previously used to a non-standard type, or the continued use of non-standard containers, it is in the interests of the hospital that the advice of the Ministry (and, in the case of hospital management committees, of the regional hospital board) should

first be obtained. A note on such repairs should therefore be submitted before the appliance is sent to Amersham.

Hospitals about to send any radium appliance for repair or recovery should give due notice to the Radiochemical Centre. The Centre will then supply appropriate transit containers if necessary. Care should be taken that radium is transported only under such conditions as may be in force or recommended at the time.

Standard Radium Containers

Needles (Trocar Points and Elongated Countersunk Eyelets)

0.33 mg. per Lineal Centimetre

Type	Total Radium Content per Container mg.	External Length mm.	Total Active Length mm.	External Diameter mm.	Total Screenage mm.	No. of Cells	Identification
A. 1	0·50	25·00	15·00	1·85	0·60	1	Gold alloy
2	1·00	42·00	30·00	1·85	0·60	2	20% iridio-platinum with 1 gold band
3	1·50	58·00	45·00	1·95	0·65	3	20% iridio-platinum with 1 gold band

0.66 mg. per Lineal Centimetre

B. 1	1·00	25·00	15·00	1·85	0·60	1	10% iridio-platinum
2	2·00	42·00	30·00	1·85	0·60	2	20% iridio-platinum
3	3·00	58·00	45·00	1·95	0·65	3	20% iridio-platinum

3.33 mg. per Lineal Centimetre

C. 1	1·00	10·00	3·00	1·65	0·50	1	Gold alloy barrel with iridio-platinum point
2	5·00	27·00	15·00	1·85	0·60	1	Gold alloy barrel with iridio-platinum point

Non-uniformly Loaded

CELLS: Type (*a*) 15·0 mm. Active length
0·5 mg. Radium content
(*b*) 7·5 mm. Active length
0·5 mg. Radium content

D. 1	1·50	42·00	30·00	1·85	0·60	1(*a*) and 2(*b*)	20% iridio-platinum with 2 gold bands
2	2·00	58·00	45·00	1·95	0·65	2(*a*) and 2(*b*)	20% iridio-platinum with 2 gold bands

Tubes (Rounded Ends and Elongated Countersunk Eyelets)

E. 1	2·50	10·00	3·00	2·75	1·00	1	10% iridio-platinum
2	2·50	14·50	7·50	3·00	1·00	1	10% iridio-platinum
3	5·00	16·70	10·00	3·40	1·00	1	Gold alloy
4	10·00	16·70	10·00	4·05	1·00	1	10% iridio-platinum
5	15·00	21·70	15·00	4·05	1·00	1	Gold alloy
6	25·00	22·50	15·00	4·55	1·00	1	10% iridio-platinum
7	50·00	24·50	15·00	5·50	1·00	1	Gold alloy

Tubes (Rounded Ends and No Eyelets)

F. 1	1·50	8·00	5·00	1·65	0·50	1	Gold alloy
2	2·50	13·00	10·00	1·65	0·50	1	Gold alloy
3	3·00	8·00	5·00	1·65	0·50	1	10% iridio-platinum
4	5·00	13·00	10·00	1·65	0·50	1	10% iridio-platinum

All containers are cell-filled. The cells are of 10% iridio-platinum and have a wall thickness of 0·2 mm. The screenage of the gold alloy containers is thus partly iridio-platinum and partly gold alloy—e.g. a gold-alloy container which is stated to have 0·6 mm. total screenage has 0·2 mm. iridio-platinum screenage plus 0·4 mm. gold-alloy screenage.

Radon

The arrangements under which hospitals on a list prepared by the Radium Commission (see below) may receive radon from the Radiochemical Centre will be continued on the same conditions as before, and the radon will be paid for by the board of governors or hospital management committee. The Minister is prepared at any time to consider application from regional hospital boards and boards of governors for additions to this list. The conditions governing the supply of radon are :

(1) The Radiochemical Centre will normally supply radon only on the order of the boards or committees responsible for the hospitals on the list. Each order must be countersigned by a radiotherapist on the staff of the hospital concerned. Radon will not be supplied to individual clinicians.

(2) Hospitals will not be added to the list unless they have the following facilities: (*a*) a properly equipped radiotherapy department; (*b*) a radiotherapist on the staff, working in collaboration with a physicist; (*c*) a properly organized follow-up of patients treated by radiotherapy.

(3) Where, exceptionally, the radiotherapist of a hospital on the list endorses a request that radiotherapy should be carried out at a hospital not on the list, the board or committee responsible for the latter may order radon, provided that the radiotherapist in question is satisfied that the radon is to be used under such conditions as will ensure efficiency and countersigns the order.

Hospitals Approved for the Supply of Radon

Teaching Hospitals.—Newcastle, Royal Victoria Infirmary; Leeds, General Infirmary; Cambridge, Addenbrooke's Hospital; Charing Cross Hospital; Guy's Hospital; King's College Hospital; London Hospital; Middlesex Hospital and Soho Hospital for Women; Royal Free Hospital; St. Bartholomew's Hospital; St. Mary's Hospital; St. Thomas's Hospital; University College Hospital; Westminster Hospital; Royal Cancer Hospital; Hammersmith Hospital; Bristol Royal Infirmary; Cardiff Royal Infirmary; Birmingham United Hospital; Manchester Royal Infirmary; United Liverpool Hospitals.

Region 2. Leeds.—Bradford Royal Infirmary.

Region 3. Sheffield.—Leicester Royal Infirmary; Lincoln City Hospital and Scunthorpe Hospital; Nottingham General Hospital; Sheffield National Centre for Radiotherapy.

Region 4. East Anglian.—Norfolk and Norwich Hospital; East Suffolk and Ipswich Hospital.

Region 5. N.W. Metropolitan.—Mount Vernon Hospital, Northwood; Elizabeth Garrett Anderson Hospital; Marie Curie Hospital; National Temperance Hospital; Royal Northern and Prince of Wales's Hospitals; Samaritan Free Hospital.

Region 6. N.E. Metropolitan.—Essex County Hospital, Colchester.

Region 7. S.E. Metropolitan.—Kent and Canterbury Hospital; St. Bartholomew's Hospital, Rochester; Kent and Sussex Hospital, Tunbridge Wells.

Region 8. S.W. Metropolitan.—Royal South Hants Hospital, Southampton; Royal Victoria and West Hants Hospital, Bournemouth; St. Luke's Hospital, Guildford; South London Hospital; Lambeth Hospital.

Region 9. Oxford.—Northampton General Hospital; Royal Berkshire Hospital, Reading.

Region 10. South Western.—Prince of Wales Hospital, Plymouth

Region 11. Wales.—Swansea General and Eye Hospital.

Region 12. Birmingham.—North Staffordshire Royal Infirmary, Stoke-on-Trent; Wolverhampton Royal Hospital.

Region 13. Manchester.—Christie Hospital and Holt Radium Institute; Victoria Hospital, Burnley.

Radioactive Isotopes

It is not proposed to alter the present arrangement whereby isotopes required for research may be obtained on application to the Medical Research Council.

Uranium Parts

Uranium parts have for some time been supplied on loan to hospitals under arrangements originally made between the Radium Commission and the Atomic Energy Research Establishment at Harwell. In future these will be hired to the board of governors or management committee concerned. The terms of the agreement will be briefly as follows :

(*a*) The pieces will be made in the required shapes by the Department of Atomic Energy of the Ministry of Supply. They will remain the property of the Department, to which they must be returned within one year on demand. They must not be machined or altered in any way.

(*b*) Attention will be drawn to the fact that uranium is a "prescribed substance" under the Atomic Energy Act. The pieces must be kept in safe custody, and a certificate showing where they are held must be given to the Department of Atomic Energy at the end of every quarter.

(*c*) The board or committee will pay the Ministry of Supply: (i) the cost of processing uranium to the required shapes, plus 5% for

departmental expenses; (ii) interest on the value of the uranium (assumed to be £5 per lb.) at 4% per annum; (iii) any carriage charges.

General Arrangements

Arrangements should not be made by any hospital to acquire, either by purchase or otherwise, any radium or other radioactive substances otherwise than in accordance with the preceding paragraphs.

Radium and other radioactive substances which are the property of the Minister of Health or Minister of Supply should not be insured. Insurances taken out by the Radium Commission earlier should be allowed to lapse. When, however, radium is on hire or loan and the hire agreement specified that it should be insured, this insurance may be continued.

The Radioactive Substances Act, 1948, empowers Ministers to make regulations to ensure the safe handling of radioactive substances and the protection of workpeople and others from dangerous radiation. The Minister will issue advice to hospitals about the protective measures necessary. In the meantime it is important that these substances should be handled only by persons with the requisite technical knowledge.

MEDICAL TEACHING IN IRAQ

The Royal College of Medicine of Iraq, founded in Bagdad in 1927, was granted contingent recognition by the Conjoint Board of the Royal Colleges in August, 1949. The present college buildings, which have been erected since 1930 in the grounds of the Royal Hospital in Bagdad, include four lecture rooms and laboratories for the departments of physics, chemistry, biology, physiology, materia medica, pathology, and bacteriology. There are also museums for biology and pathology, a dissecting room, a library, and chemical stores. Clinical instruction is given in the Royal Hospital (650 beds) and the Infectious Diseases Hospital (100 beds). The Royal Hospital has Vaccine Lymph, Anti-rabies, and *X*-ray Institutes.

The Government of Iraq are anxious to maintain and improve the high standard of teaching in the college, for on its students will depend the quality of the Iraqi Medical Services. They have therefore asked the British Government to help them to find British doctors to fill the new chairs of public health, pathology, pharmacology, anatomy, and radiology, and the lectureship in chemistry and biochemistry. These important teaching posts offer wide opportunities for research, and the clinical material is excellent and varied. During the present year there are 379 students (336 men and 43 women) in the college, and classes average between 50 and 60 students.

Iraq's needs are great. British doctors appointed to these jobs will have the satisfaction of knowing that they are providing services of fundamental importance in a country to which Britain is bound by close and long-standing ties of friendship. The terms offered are a basic salary of up to £3,600 per annum for the professorships and £2,400 per annum for the lectureship, for a three-year contract, which is renewable. Application forms can be obtained from the Crown Agents for the Colonies, 4, Millbank, London, S.W.1. Any inquiries about the nature and functions of the post, conditions in Iraq, etc., should be addressed to the Middle-East Secretariat, Foreign Office, who will be glad to see interested candidates.

GENERAL ELECTION

A list of the medical men and women who are standing for Parliament has already been published (January 21, p. 178). At least two doctors' wives have also been adopted as candidates.

Mrs. DOREEN GORSKY, Swindon, Liberal.

Mrs. Gorsky is the wife of Dr. J. A. Gorsky, who is contesting the Cities of London and Westminster constituency, also as a Liberal candidate. He is a member of the Council of the British Medical Association.

Mrs. Margaret WALKER, Edinburgh West, Liberal.

Mrs. Walker is the wife of Dr. E. R. C. Walker, Scottish Secretary of the British Medical Association.

Reports of Societies

SUDDEN DEATH IN NURSLINGS

At a meeting of the Liverpool Medical Institution on January 12, with the president, Professor CHARLES WELLS, in the chair, Dr. F. B. SMITH read a paper entitled "A Paediatric Problem: Sudden Death in Nurslings."

Dr. Smith said that the difficulties in investigating the sudden and unexpected deaths of nurslings were obvious to those who performed necropsies for coroners, but were not so obvious to those with less experience of this type of work. In his experience and excluding the newborn, these cases formed the second largest group of sudden deaths examined for coroners, the first being deaths due to diseases of the coronary arteries. The details of 60 cases had been reviewed for the purpose of this communication.

These infants were usually between 4 and 40 weeks old and were thought to have had normal health up to between a few minutes and 6–8 hours of being found dead. Smothering, overlaying, and choking by food had been the common classifications of the causes of death in the past. With an increase in the proportion of cases in which necropsy was undertaken the tendency in the more recent publications was to assign death more often to natural causes, usually acute infections of the respiratory tract. Little had been published about the detailed criteria on which to base a finding of death from natural causes. Necropsies on infants known to be ill were often inconclusive; naked-eye examination was more often inadequate than was the case in adults. A set scheme was necessary, including the use of the microscope, bacteriology, histology, and, if possible, chemistry. The evidence available before operation was often circumstantial, inadequate, and tendentious. The damage caused by a wrong verdict of unnatural death might be lasting. In spite of the inexpediency of delay, the proper course for the pathologist might be a request to the coroner for time for microscopical study.

The speaker was loath to accept the view that the average nursling of this age allowed accidental smothering. Evidence on the presence and the effect of gastric contents in the airways was often doubtful—for example, vomiting was a symptom of anoxia, and food was found in the airways after death from many natural causes. He did not believe that small infective foci in the respiratory or other tracts, found only by the microscope, could explain a sudden and unexpected death. Though serosal and interstitial haemorrhages occurred apart from obstructive anoxia, the striking flea-bitten appearance of one or all of the three organs, thymus, heart, and lungs, had not been seen in other circumstances. The possibility of some chemical, allergic, or endocrine stimulus deserved consideration. The function of the thymus was unknown, and most of these infants died in the third or fourth months of life, at which time the thymus was at its largest in proportion to body weight. About one-third of these infants were found to have parietal craniotabes but without clear signs of rickets.

In not more than 15 of the 60 infants examined was it possible to say that death was due to a specific infection, and in 7 of the 15 the evidence was slender. Most often the preferable conclusion was that the cause of death was unknown. Dr. Smith concluded with a plea for avoiding if possible an opinion based on inadequate facts, and for the use of schematic routine histology and bacteriology after death. He also asked again for the determination and publication of the criteria on which to make the final diagnosis in the case of the so-called "suffocated" infant.

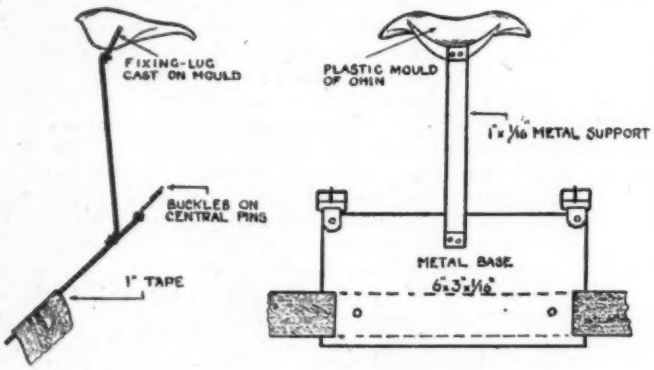
The National Association for Mental Health has published a report of the conference on the scientific study of juvenile delinquency held on October 1, 1949, an account of which appeared in this *Journal* on October 15, 1949 (p. 866). The report is obtainable for 2s. 6d. from the National Association at Maurice Craig House, 39, Queen Anne Street, London, W.1.

Preparations and Appliances

CHIN SUPPORT IN FLEXION DEFORMITY

Dr. J. MIDDLETON, Brightlingsea, writes: The apparatus illustrated is designed as a support for the lower jaw in cases of extreme flexion of the cervical spine from any cause so long as the head can be manipulated to the normal horizontal axis. It is modelled on the mouth–chest speaking instrument used by telephone exchange operators.

A plastic mould of denture base materials is made from a wax impression taken from the lower jaw, not extending further back than a point 1 in. (2.5 cm.) in front of the angle of the jaw. A plastic lug is added during the casting of this mould to provide means for fixing to a vertical support made from a piece of strong yet light metal 4½ by 1½ by 1/16 in. (11.4 by 3.8 by 0.16 cm.). This is secured to the mould by two small bolts. The lower end of this vertical member is riveted to a sheet-metal base 6 by 3 by 1/16 in. (15.2 by 7.6 by 0.16 cm.). To each of the top corners of this "breast"-piece a buckle is fixed, one central pin only being used for each buckle, to allow



for free movement. These buckles should be wide enough to take 1-in. tape. Along the lower edge of the chest-piece is secured 1-in.-wide tape of sufficient length to allow each half to pass under the arm, across the back to the opposite shoulder, and down to the buckle to which it is secured; or it may be brought through the buckle and back to behind the neck to join the opposite end of the tape (this latter method is used in the prototype). Brass, copper, or aluminium alloy may be used provided there is sufficient rigidity, particularly for the vertical member. The metal base and the support may be covered with "rexine" or other suitable material.

The support is of considerable benefit in cases of acute flexion deformity—arthritis, ankylosing spondylitis, extreme cervical and thoracic kyphosis, and healed active disease of bone in the thoracic or cervical area with residual flexion deformity. Large numbers of such cases complain of pain in the muscles of the posterior triangle of the neck and discomfort in or behind the eyes. The support given to the chin in a fairly horizontal position is sufficient to afford relief from these symptoms.

The wearing of the apparatus does not interfere with either speech or mastication of food. In extreme cases the *relative* field of vision is obscured in the upper half by reason of the fact that the true horizontal axis of the eye becomes nearly vertical; the wearing of the support brings this axis back to normal, and the stress on the superior ocular muscles is relieved. It also affords the patient fuller vision with less difficulty.

It is thought that the support may be of especial use to the elderly patient who is more or less confined to the house. It is easily managed, and there is no cosmetic objection or discomfort.

The apparatus was designed and manufactured at my suggestion by Mr. B. Parker, of Brightlingsea. to whom I wish to record my very sincere thanks.

Correspondence

Perforated Peptic Ulcer

SIR,—Dr. F. Avery Jones and his colleagues at the Central Middlesex Hospital can always be relied upon for valuable contributions to our knowledge of the peptic ulcer problem. The assessment by Dr. Avery Jones, Dr. P. J. Parsons, and Miss Barbara White (January 28, p. 211) of the factors responsible for the recent fall in the mortality from perforated peptic ulcer is no exception, and with their main conclusions I am in entire agreement. My purpose in writing is to put forward the thesis that better anaesthesia has been the greatest single factor in this reduction, and this runs contrary to their opinion that antibiotics have played the greater part. Though this may be, as they say, merely an academic point, yet, speaking as a surgeon with a deep sense of obligation to the excellent anaesthetists with whom I have worked in the past 25 years, I feel that if the main credit is due to the anaesthetists it should be acknowledged.

Avery Jones states that for the clearest assessment of the factors responsible it is desirable to study the problem in one unit over a number of years. My term of responsibility for the surgical care of the bulk of patients suffering from perforated peptic ulcer in one surgical unit of the Victoria Infirmary, Glasgow, extended without a break from 1927 to 1946, so that I can lay claim to having fulfilled the criteria. My entrance upon this work early in 1927 synchronized with the appointment for the first time of specialist anaesthetists to the hospital. Anaesthesia in emergency work, previously undertaken by house-surgeons, was now placed in the hands of the specialist anaesthetists. There was an almost immediate and striking improvement in the standard of anaesthesia.

In 1936, in a communication[1] dealing mainly with the later results of operations on the stomach and duodenum, I reported a personal series of 62 patients with perforated ulcer of the duodenum operated upon in the preceding nine years, with four deaths—a mortality of 6.5%. That these results, regarded then as above the average, were not due merely to a run of good luck or to any personal aptitude in the management of these cases was proved by the fact that my surgical colleagues in the hospital were obtaining results quite as good or even better. Again, if my memory serves me rightly, there was about this time an excellent series reported from Newcastle with a mortality of only 5%.

In 1945, in a review of the patients with perforated ulcer treated from 1942 onwards to determine whether there was any drop in mortality attributable to the use at operation of sulphanilamide intraperitoneally, the mortality was found to be 5%—a reduction which I did not regard as statistically very significant, and certainly no better than the results of my colleagues who did not employ antibiotics intraperitoneally.

The fall in mortality during the war years was also aided by the fact that the increased incidence of perforated peptic ulcer among the general population was due, in Scotland at least, to an increase in duodenal perforations. The ratio of duodenal ulcer to lesser curvature ulcer, which during the years 1927 to 1935 was as 6 to 1, in my series rose by 1940 to 12 to 1—and this was not due to the inclusion for the first time of the juxtapyloric ulcers as duodenal, for these, from radiological experience, had always been classified as duodenal. In my experience the lesser curvature perforation occurring in older patients (more subject to early and late post-operative complications) was a far more serious problem, and carried a mortality about four times as great as duodenal perforation. It is only fair, therefore, to state that my own statistics were flattered by the consideration of the duodenal ulcer perforations as a group separate from the lesser curvature perforations, even though the latter were relatively few in number.

The sulphonamides certainly made their contribution in the treatment of post-operative chest complications, and a great comfort they were to the surgeon as well as the patient, but the big fall in mortality took place before the sulphonamides

were introduced, and in my opinion it was due to excellent anaesthetic technique, owing nothing at that time to curare, and dependent entirely upon care, skill, and experience in the administration of ether.

From the surgical standpoint the last 25 years have witnessed other changes for the better. In the early years the bogy of peritonitis loomed very large. Every minute of delay was regarded as dangerous. The ideal was to get the patient into hospital and his perforation closed within two hours. Sometimes we managed it in less and killed the patient, because operation was carried out before the primary shock had passed off. Here again it was the anaesthetist who helped to point out the error of our ways. Yes, antibiotics are wonderful, but let us give honour where honour is due—to the skilled anaesthetist.—I am, etc.,

Glasgow. ROBERT MAILER.

REFERENCE

1 *Glasg. med. J.*, 1936, **125**, 109.

Future of Occupational Health

SIR,—May I comment on a point in Dr. Donald Stewart's most interesting and comprehensive paper on the future of occupational health, read at the Annual Meeting at Harrogate and published recently in the *Journal* (January 21, p. 156)? Under the section on "Education in Occupational Health" he states: "There is some sporadic training provided in London for the Diploma in Industrial Health of the Royal Colleges and of the Apothecaries' Hall, but in England generally adequate training schemes for the D.I.H. are found only at Manchester University."

I fear that Dr. Stewart has been somewhat misinformed. Far from sporadic training, I would like to stress the fact that from the inception of the D.I.H. the Royal Institute of Public Health and Hygiene, for example, has carried on a most searching and comprehensive course of eight months' intensive training—more than adequate to comply with the regulations of both the Royal Colleges and of the Society of Apothecaries. The course involves not only theoretical and sociological teaching by approximately seventy teachers, well qualified to deal with the various aspects, but also practical training at some 25 factories engaged in both the light and heavy industries, including their welfare work and rehabilitation schemes. Students also have clinical instruction at the appropriate clinics of London teaching hospitals (eye, skin, and accident). The results of the training have been amply reflected in the pass lists of the examinations held by the Royal Colleges and by the Apothecaries' Society, an average percentage of success being sixty.

Apart from these comments one can have only a high appreciation of Dr. Stewart's survey of the future of occupational health.—I am, etc.,

E. GOODWIN RAWLINSON.
Dean, Royal Institute of Public Health and Hygiene.

London, W.C.1.

Mikulicz's Syndrome

SIR,—Dr. Alan J. Hird, whose recent death from a distressing mountaineering accident we all lament, had an article in the *British Medical Journal* a few months ago on Mikulicz's syndrome (August 20, 1949, p. 416). His first paragraph refers to the infrequency of the syndrome, and I think it requires correction, especially his reference to the experience of the Glasgow Western Infirmary, as judged by a very inadequate study of the records of that hospital. As a matter of fact two cases of Mikulicz's syndrome were in my wards in the Western Infirmary within comparatively recent years; in both of them the primary illness was leukaemia, and the involvement of the lacrimal and salivary glands was a rather unusual complication of that mysterious disease. Both these cases were very similar to Dr. Hird's, and they were indexed, rightly I think, as leukaemias.

To get the real frequency of Mikulicz's syndrome one would require to investigate all the cases of leukaemia admitted to hospital, and that would be rather a large order. The first of my cases was a man who was reported as going home "improved," but of whom no further notes are available. The second was a woman who died in hospital. A very careful post-mortem examination in this case confirmed the diagnosis.

Dr. Hird's case is interesting and most carefully reported. I would have included it in the group of the leukaemias from the beginning as an aleukaemic lymphatic leukaemia. Undoubtedly Mikulicz's syndrome is most commonly a complication of that disease.—I am, etc.,

Bearsden, Glasgow. JAMES CARSLAW.

Insufficient Anaesthesia

SIR,—The account of the case which Dr. E. H. Winterbottom (January 28, p. 247) had the courage to report is surely very important and timely. During the last three years I have repeatedly questioned anaesthetist friends about the possibility of curarized patients becoming conscious during operation and being unable to make either the anaesthetist or surgeon aware of the fact. I have always been answered that such a condition could not arise. They, however, failed to convince me, and Dr. Winterbottom's case shows that my fears were not unfounded.

It seems to me a little sad, when one thinks of all that anaesthetists have done in the past fifteen years to eliminate the causes of so many of the fears of patients about to undergo operation, that patients should now be faced with a risk more horrible to contemplate than any I can recall during the period of my 35 years' active practice. If such a thing can occur in the hands of a skilled anaesthetist I wonder how many times it has occurred in the practice of those less adept. I am afraid if I am unfortunate enough to become a patient I shall be more fearful of the anaesthetist than the surgeon.—I am, etc.,

Painswick, Glos. RAYMOND E. APPERLY.

SIR,—Dr. E. H. Winterbottom's letter (January 28, p. 247) raises a point that has been uppermost in my mind for several years, and the experience of his patient under "minimal" anaesthesia should be a lesson to us all. When the tidal air is greatly reduced, as is frequently the case with adequate curarization in abdominal operations, it appears to me that adequate oxygenation cannot be maintained with anaesthetic mixtures of nitrous oxide and oxygen. For this reason I have always maintained anaesthesia with either cyclopropane or ether and oxygen, or added repeated doses of thiopentone.

Closed-circuit anaesthesia by means of nitrous oxide and oxygen is most difficult, and before the advent of curare I found it almost impossible to keep an even level of anaesthesia when carrying a patient who had been given a spinal or regional analgesic. In those days I usually used cyclopropane, ether, or vinyl ether in the closed circuit with oxygen, and I feel, now that we rely upon curare, this applies even more forcibly. When an inflammable anaesthetic mixture is contraindicated then oxygen may still be employed, but with repeated doses of thiopentone, just to make certain that the patient does not have a nightmare suggestive of consciousness during curare anaesthesia.—I am, etc.,

London, W.1. VICTOR GOLDMAN.

SIR,—The unfortunate experience recorded by Dr. E. H. Winterbottom (January 28, p. 247) of the patient who regained consciousness during an abdominal operation, while fully curarized and so unable to bring her predicament to the notice of the anaesthetist, must give rise to speculation as to how often this event has occurred. In a previous communication (January 18, 1947, p. 111) I stressed the danger of shock from too light anaesthesia in conjunction with curare, and cases such as this no doubt explain the poor post-operative condition of the patient which is found when curare has been incorrectly administered.

The anaesthetist who described this case must be thanked for publishing it in order that others may not fall into the same error. His letter has, however, had another, perhaps unexpected, effect. It may not be generally realized how often the lay

public peruse this *Journal*; three days after the letter appeared, when doing a pre-operative visit on a patient about to undergo a hysterectomy, I found the natural dread of anaesthesia exaggerated to an alarming degree. On questioning her, I realized that she had read this letter, and I had to give the most solemn promise that curare would not be used and that she would not come round during the operation—which only partially reassured her, as she was still obviously frightened when anaesthetized the following day.

One hundred and four years ago Oliver Wendell Holmes said of anaesthesia, "The fierce extremity of suffering has been steeped in the waters of forgetfulness, and the deepest furrow in the knotted brow of agony has been smoothed for ever." It would be unfortunate if the modern anaesthetist should ever forget that although curare may smooth the furrow it does not eliminate the agony.—I am, etc.,

London, W.1. MASSEY DAWKINS.

Glomerular Blood Flow

SIR,—In my student days at Bart's there was a specimen in the museum showing both kidneys, both ureters, the bladder, and the penis of a boy who had died at the age of 11 years from uraemia. Both kidneys were hydronephrotic and both ureters dilated. It was one of the specimens I have never forgotten: it displayed the effect of persistent phimosis. And in my subsequent career I have from time to time been consulted by mothers bringing their infants of three or four months, complaining that the child was not well, did not seem to get on, did not relish his food, fearing the impendence of some horrible disaster. In such cases the first thing I have done was to inspect the penis, and there, every time, was phimosis. A timely circumcision, and the whole picture changed.

How explain all this? There is only one answer—it is that an obstruction to the outflow of urine from the kidney, however caused, obstructs the blood flow through the glomerular capillaries. This is so whether the individual suffers from phimosis, hypertrophy of the prostate, marked cystocele, ureteral occlusion by extension of a cervical carcinoma, kinking of the ureter high up near its junction with the renal pelvis from prolapse of the kidney, or from undue pressure on the kidney itself by other organs, whereby the uriniferous tubules, remarkable for their circuitous route and the hair-pin corners of Henle's loops, become too compressed, preventing the fluid in Bowman's capsules from escaping as it ordinarily should. This last occurs in many diseases—e.g., during tonsillitis and pneumonia—from the incessant retching, restlessness and cough, and is not an uncommon event in the previously healthy young woman already many months pregnant.

Unfortunately, so it seems, clinicians have not got so far: their interpretation is different—all is to be attributed to some biochemical change. It amazes me that in the issue of the *Journal* in which the correspondence on the "Fate of the Foreskin"—of less importance than the fate of the individual—is continued, and in which we have presented the latest ideas of all the experts about the cause of toxaemia of pregnancy, not a single one of those participating in this symposium, as judged by your report (January 28, p. 242), has paid any attention to the biophysics of the kidney From this it would seem that the mechanics of pregnancy are still quite unknown and indeed scarcely approached. Although woman is a material object, and when put to the test is found to be attracted to the earth by a certain force which can be measured, it is supposed, on the insupportable assumption that physical conditions in no wise affect biochemical change, that during pregnancy the changes which occur are of an order spiritual—mystic in nature, biochemical in kind—as though chemical reactions whether in the test-tube or in the body occur irrespective of physical conditions.

One of the speakers advanced the view that the changes which occur are primarily vascular, but he attributed them to "vascular disturbances consequent on arteriolar spasm." Why, I venture to ask, arterial? Why not capillary obstruction? Another objected to the term "toxaemia" for these pathological phenomena; and with reason, for in truth the changes which occur are due simply to the rise of catabolic products. The so-called "toxaemia of pregnancy" is nothing more than an autointoxication, as Rivière long ago pointed out. A third, recognizing "the defects in existing knowledge," but making no attempt to smooth these out, clung to the idea of a "toxaemia," for he could not see how any factor other than a toxin could affect the glomerular capillaries. But clearly the circuitous course of the uriniferous tubules and Henle's loops can have an obstructive effect: if the fluid in Bowman's capsules cannot readily escape, the pressure on the glomerular capillaries must be increased, necessitating an increase in the general blood pressure if the output of urine is to be maintained. It is the cause of the so-called hypertension in otherwise healthy pregnant women. Essential hypertension in pregnancy, in my view, does not occur: but a raised blood pressure may often be the first sign of anything going wrong. Essential hypertension, as I understand it, is a state in which the arterial blood pressure is raised without any indication as to its cause. In pregnancy, when the blood pressure alone is raised, its cause is to be found in a difficulty of the blood flow through glomerular capillaries.

Circumcision in the phimosal restores the patient to health: and measures to reduce the obstruction to the flow of urine through the uriniferous tubules in young pregnant women cause a return in them to health and happiness.—I am, etc.,

Rugby. R. H. PARAMORE.

Fate of the Foreskin

SIR,—In the course of 25 years of general practice I must plead guilty to having performed over 300 circumcisions—most of them in the first two weeks of life and without anaesthesia. With ordinary aseptic technique the operation can be carried out in little over a minute, and, provided care is taken to avoid the fraenal artery, haemorrhage can frequently be avoided. An oozing vein occasionally requires tying off, and this takes a little longer. Despite the fact that this procedure has usually been performed in the patient's house, aided and abetted by the midwife, I have experienced none of the grisly complications enumerated by Mr. Denis Browne (January 21, p. 181), and can recollect only one case that developed a small meatal ulcer, which occurred six months after the circumcision and was associated with a "napkin rash."

Putting on one side such problematical considerations as the incidence of venereal disease in the uncircumcised and the effect of circumcision in preventing carcinoma of the cervix in the Jewess, I am old-fashioned enough to contend that the advantages of early circumcision clearly outweigh the disadvantages. From the viewpoint of personal cleanliness alone this small operation is justified. It would be interesting to know how many of the uncircumcised take the trouble to carry out regular washing of the glans and corona. Balanitis is not by any means a rare condition, and many of us are familiar with the inelastic and irretractable prepuce of elderly men—under which whited sepulchre lies a fertile soil for the ultimate development of the by no means uncommon penile carcinoma. To state that circumcision among Christian communities is a religious ritual is surely a gross exaggeration. Mr. Geoffrey Parker (January 21, p. 181) goes even further and makes the excised foreskin an excuse for what appears to me to be an attack on organized religion. No one has ever suggested that the removal of a normal appendix is a barbaric custom with any religious significance, yet how many appendices are resected in the course of a laparotomy for some other condition? The surgeon tells us, and rightly, that by doing so he is merely taking a precautionary measure and eradicating a possible source of subsequent pathology. Might not the same be said of the foreskin?

Poor thwarted Nature may eventually succeed in producing Mr. Parker's perfect specimen of man. This glorious being will doubtless come into the world minus his tonsils and appendix, and with an auditory meatus that automatically closes whenever ecclesiastical dogmata are mentioned. He may even be jet-propelled, with a retractable undercarriage and a small, neat, and easily retractable foreskin.—I am, etc.,

Blackburn, Lancs. T. J. BURKE.

SIR,—In his excellent study (December 24, 1949, p. 1433) Dr. Douglas Gairdner has fulfilled an ambition which I have long cherished—namely, to follow the development of the prepuce, which is usually described as being "phimotic" at birth, and to show how this is really a normal stage in its maturation and separation.

Circumcision of the newborn has seemed to me to be an unnecessary operation, and the mothers of infants referred are told that there are no medical indications for the operation, but that it will be carried out if they expressly wish it. Very often the mother is satisfied to leave Nature alone, but sometimes she says that her husband, who was in the Army, wants it done (presumably a reference to the prevalent view that a prepuce predisposes to V.D.). One mother was most anxious for the operation to be carried out because her own doctor had convinced her that when the boy grew up lack of cleanliness would lead to local irritation, thence to masturbation, and thereafter down the steep and slippery slope of total moral degradation. What hope has one of avoiding an operation, however unnecessary and barbaric, in the face of such terrible alternatives?

In the middle of the eighteenth century in certain circles in London every newborn babe was operated upon for tongue-tie. In some maternity (non-Jewish) clinics in America to-day every male baby is circumcised. Most of us have progressed so far from the former practice that severance of the lingual frenum is never now recommended, and it is high time that we curbed our ambition to improve on Nature by allowing the foreskin to remain *in situ* for at least the first three years of life. Many will be grateful to Dr. Gairdner for having aired this most controversial subject, which, even among medical men, is hedged about with emotion and prejudice.—I am, etc.,

London, E.C.1. IAN G. WICKES.

*** This correspondence is now closed.—ED., *B.M.J.*

Erythema Nodosum

SIR,—Dr. S. Doxiadis (January 21, p. 191) states that "the eruption of erythema nodosum may precede the appearance of radiological evidence of primary tuberculous infection by one to three months." I submit that this is entirely coincidental, and that the two conditions cannot be scientifically correlated. During nearly fifty years of general practice I have seen only one case of erythema nodosum in a tuberculous patient, and this patient, under my care for the last 20 years, has never been definitely proved to have tuberculosis, being now quite well. In my opinion—quite unscientific and purely the result of practical experience—over 99% cases of erythema nodosum are rheumatic in origin and yield readily to sodium salicylate.—I am, etc.,

Stowmarket, Suffolk. H. S. GASKELL.

Dangers of Dicoumarol

SIR,—I should like to be allowed to answer Dr. H. Lempert's letter (January 21, p. 183). I remarked in an earlier letter (December 17, 1949, p. 1416) that the reduction of prothrombin level by dicoumarol to 60–75% of normal seemed sufficient to aid recovery from thrombosis and to prevent an already existing thrombus from extending or causing a thrombo-embolic complication. Dr. Lempert doubts the efficacy of this treatment. The proof of the pudding is said to be in the eating thereof, and my results to date are as follows.

First-aid treatment for thrombosis has been given in the home on 52 occasions. Of these 34 were coronary thombosis, four were mesenteric, five cerebral, and nine venous thrombosis of the leg. During the first three days of treatment dicoumarol is not effective, and after that time there have been no deaths and only three slight thrombo-embolic complications. One person aged 78 years and one aged 69 years had further small coronary infarcts, and one aged 71 had a pulmonary embolism. During the first three days of treatment there were three deaths from severe cardiac infarctions.

Admittedly one cannot be dogmatic about the results of 52 cases, but they compare well with the results of those observers, quoted by Dr. Lempert, who aimed at a reduction of prothrombin level to 10–20% of normal. And it must be remembered that these observers had several cases of haemorrhage, some severe, while my cases naturally were well above the level of possible haemorrhage.

I noted in my cases that coronary thrombosis was commoner in the winter than in the summer months, so to 31 persons who have had thromboses I have given dicoumarol as preventive treatment against embolism for at least six months of the year for one to four years. Seven deaths have occurred while these persons were not under the influence of dicoumarol, though in two cases they were probably partly affected by the drug. No death occurred while the prothrombin level was between 60 and 75% of normal. Of the survivors, 18 were coronary, four mesenteric, and two cerebral thrombosis cases, and only one further small coronary thrombosis in a man of 60 years was noted as a thrombo-embolic complication.

My interest in dicoumarol began in 1943. A man with lymphatic leukaemia had several mesenteric thromboses between July, 1941, and June, 1943, the first attack being verified by laparotomy. During this period he was frequently in agonizing pain and several times was so shocked that doubt was entertained as to the possibility of his recovery. He was then given dicoumarol till his prothrombin level was between 60 and 70% of normal and kept there for over three years till he died. During this time he went back to work and had only one short attack of pain, when on examination his prothrombin level was found to have reached 85%, and the dose of dicoumarol was then increased from 50 mg. every other day to 50 mg. every 36 hours. Theoretically the reduction of prothrombin level to 20% of normal may be the ideal aim in cases of thrombosis, but practically I believe that in the majority of cases a reduction to 60–75% of normal serves as good a purpose. In other words, whatever the tendency of the blood to clot, whatever the degree of the thrombotic state present in the blood, it does not as a rule seem to reach a level which requires more than a 60–75% prothrombin level to balance or counteract it, though doubtless there are exceptional cases.

Except in the presence of liver or kidney disease, once the prothrombin level is stabilized I have on only one occasion needed to reduce the dose of dicoumarol in a total of 83 cases, and in that one case the reduction was trifling. Prothrombin tests in the long-term dicoumarol cases are done monthly after stabilization. The patients are warned about the danger of intercurrent illness and are told to report any suspicion of it at once. Naturally dicoumarol is not given into the hands of any unintelligent person. On the other hand, I have occasionally had to increase the dose of dicoumarol to retain the lowered prothrombin level, particularly in younger subjects, and this to me is a very suggestive finding. Here is a case in point.

A man of 40 years, hitherto very fit and healthy, saw a child fall off a cliff. He rushed to help, and while resting on his return home he had a coronary thrombosis. He recovered, and his prothrombin level was kept at 60–75% of normal. After six weeks the prothrombin rose to 85% and the dicoumarol was increased. The prothrombin level fell to 70%, but six weeks later, in spite of the increased dose of dicoumarol, it was 100%.

This suggests that, just as shock can cause a hyperthyroid state which is temporary, so can it produce a thrombotic state which gradually disappears. The fact that coronary thrombosis occurs under 45 years of age almost solely in men is strongly suggestive of an endocrine factor. The preponderance of overweight sufferers points to the possibility of an added metabolic factor. And the important observation to make here is that an endocrine dyscrasia or a metabolic dysfunction are diseases from which the body can recover. After 45 years of age coronary thrombosis in women approximates in frequency to its incidence in men, and is then probably induced to a large extent by the atherosclerosis of vessels which is part of the legacy of age, a wearing out of the tissues. So the tendency to a thrombotic state in older persons is not likely to improve, though there may be temporary waxings and wanings thereof from incidental factors.

Finally, I would suggest that the intelligent use of dicoumarol in general practice is a safe procedure which can serve a very useful purpose, but I heartily endorse Dr. Lempert's view that

to attempt to reduce the prothrombin level to 20% of normal anywhere except in hospital is flirting with tragedy. But I must emphasize that I have not found in the literature on this subject anything to persuade me that this flirtation is to the benefit of the patient.—I am, etc.,

Leeds. R. A. MURRAY SCOTT.

SIR,—In view of the recent controversy on the uses and abuses of anticoagulant therapy we should like to add our views by giving a brief survey of 161 cases treated in the past twelve months. Both in prophylactic use and in use where established thromboses have occurred we have found anticoagulant therapy to be a successful and safe procedure. There has been standardized laboratory control throughout.

Because of the recognized susceptibility to thrombosis of patients after gynaecological operations we have worked in collaboration with Professor F. J. Browne, and we have given prophylactic anticoagulant therapy (dicoumarol) from the fourth day after operation to 140 of his patients who had undergone major operations, including prolapse cases. None of these patients has developed any evidence of thrombosis. One of the patients had a vaginal haemorrhage which ceased when the drug was stopped. In this case there was an accompanying secondary infection of the operative site. Besides this series, 21 cases of established thrombosis and four cases of pulmonary embolism were treated with anticoagulant therapy (heparin + dicoumarol). Apart from one patient who had had a prostatectomy and who developed haematuria with an accompanying urinary infection, the therapy did not give rise to any alarm, and all the patients made a successful recovery.

James's[1] technique for taking and estimating the prothrombin level was used, human brain being the source of thrombokinase. On no occasion was there haemolysis of the test sample, because needle and syringe were dry sterilized and the Wintrobe tubes containing the dry anticoagulant mixture were *gently* inverted.

For prophylactic treatment a base-line time was obtained two days after operation. On the fourth post-operative day 300 mg. and on the fifth post-operative day 200 mg. of dicoumarol was given. In order to control further therapy estimations of the prothrombin level were made on the fifth, seventh, ninth, and subsequent alternate days.

In cases of established thrombosis, as soon as blood had been taken for base-line estimation, 10,000 units of heparin were given intravenously every six hours for 48 hours. Dicoumarol (300 mg.) was given immediately, followed by 200 mg. the next day. At the end of 48 hours an estimation of the prothrombin level was made to control the next dose of dicoumarol. Subsequent estimations were made on alternate days. In the established thrombosis cases we aimed at keeping the Quick's index between 10–30%. In prophylactic cases our aim was to keep the index between 30–40%.—We are, etc.,

N. P. KALRA.
Watford, Herts. B. A. THOMPSON.

REFERENCE

J. clin. Path., 1949, **2**, 45.

An Unusual Murmur

SIR,—In 1946, while serving with the R.A.F. in the Shetland Islands, I saw a young airman with a very remarkable and unusual murmur. This man developed sudden pain in the left chest, breathlessness, cold sweat, small rapid pulse, and cyanosis. He was seen shortly afterwards by a local practitioner, who immediately transferred him to hospital. A loud double click, synchronous with his pulse, was audible through his tunic and at a distance of several feet. This was extremely loud when a stethoscope was used, and made it difficult to hear the respiratory murmur or indeed any other sound at any part of the chest. Clinically no gross pneumothorax was apparent.

I first saw the patient three days later. He was now quite recovered from shock, though the heart beats could still easily be heard from several feet away from his bed. These resembled a poor reproduction of the heart sounds as heard on a record from an electrically amplified stethoscope. The condition was not changed when the patient held his breath. The condition gradually improved and faded in the course of ten days. The patient, now fit to travel, was sent for a consultant's opinion, and he suggested a spontaneous pneumo-pericardium in conjunction with a small pneumothorax which had most probably been missed in our anxiety in examining the heart shadow. The presence of a very small but definite apical pneumothorax on the left side was confirmed, but the rather indefinite cardiac outlines could not be stated as due to air in the pericardium.

I am quite sure my medical colleague under whose care this medical curiosity occurred will recognize, even from this brief letter, the occasion on which we stood at the end of a bed and, like Dr. F. A. Ward (December 10, 1949, p. 1353), considered coronary thrombosis, emphysema, pneumothorax, etc., but on the surface decided it most resembled a clock hidden inside the patient's chest.—I am, etc.,

Lancaster. GRAHAM H. ANDERSON.

Axis Traction

SIR,—In his interesting review of midwifery over the past fifty years Professor R. W. Johnstone writes (January 7, p. 12): "The 'high' forceps operation has no place in modern obstetrics. Axis traction is now, therefore, of academic and historical interest rather than of living practical value. *Sic transit gloria.*" With such brief obsequies is this most fruitful idea interred by the school which contributed so much towards its early development. Professor Johnstone is not alone in his assertion of a usefulness that is no more, for Mr. Percy Malpas told us some time ago that "the era of axis traction has now passed."

Do these authorities mean that, for one reason or another, it is now no longer necessary to make traction in the axis of the birth canal when performing the forceps operation? If so, there are many technicians who will disagree with them unless they can show that some other principle of traction obtains a greater mechanical advantage. Do they mean that the era of the high-forceps operation has passed? If so, there are few who will quarrel with them, although this may be the operation of choice in certain cases following the correction of malpositions and in a few cases of dystocia in multiparae. Why confound a mechanical principle with an individual operation? Designed for application to the head above the brim, the principle is yet sound for the forceps operation at any level of the birth canal. Milne Murray, in the original description of his instrument, lays great stress on the accuracy with which the head can be brought through the vulva by its use. He states (I write from memory) that in the ten years during which he had used it he never tore a perineum. If we remember the kind of case Murray very often had to deal with this performance must be without parallel in obstetrical practice. He does not extol the virtues of his instrument when the head is at intermediate levels, but nevertheless the basic principle allows delivery from any plane of arrest with minimal force, and this, when other factors are equal, is the measurement of greatest mechanical advantage.

I should like to make it quite clear that I am not raising any question which suggests the merits of one instrument over another, but one regarding a principle in the mechanics of the forceps operation. I have no doubt that obstetricians who are skilled in the use of other types of forceps can obtain every mechanical advantage that is derived from the use of the Milne Murray instrument. De Lee advocates the much older Pajot manœuvre to coax the head along the path so well illustrated in his textbook.[1] Nor am I prepared to argue that emulation of Murray's performance is preferable to episiotomy. I merely ask why these two masters have abandoned axis traction, and in what direction do they now apply traction when the widest diameter of the head is still above the plane of least dimensions, and I do so because their explanations may help me to improve my own technique.

Teachers of obstetrics have long condemned any kind of forceps operation as a solution to the problem of disproportion, but most of them still approve axis traction in forceps technique. The most recent edition of one of the best of British textbooks[2] emphasizes the application of this principle and the need "to

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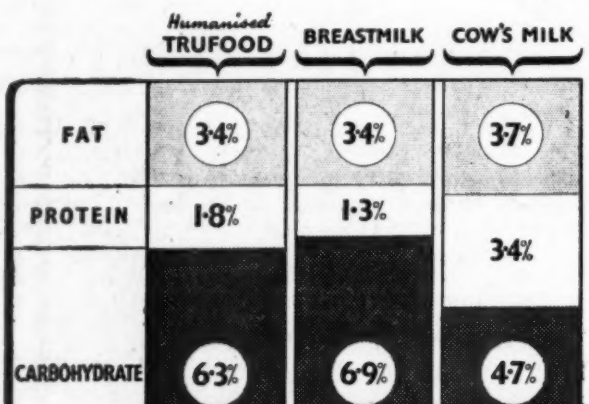

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THE USE OF VAGINAL TAMPONS FOR THE ABSORPTION OF MENSTRUAL DISCHARGES

An important clinical study

No. 4

Abstracted from Volume 46, No. 2, pages 259-265, August 1943 edition of the American Journal of Obstetrics and Gynaecology.

In 1933, a type of vaginal tampon for the absorption of the menstrual discharges was patented by E. C. Haas of Denver, Colorado, and became very popular around 1936. In 1938 and 1939 a certain amount of medical literature in favour or against the use of menstrual tampons was published in this country and abroad. However, there was no accurate information available of studies carried on over any considerable period of time indicating whether the use of self tamponage for the absorption of menstrual discharge was harmful or not.

To contribute accurate information over an extended period of time . . . 110 young, active women between the ages of 19 and 40 years volunteered for a protracted study from October, 1939 to January, 1942. 14 were married and 96 were single. Special care was taken to record any pelvic pathology present at the time of the initial examination and to observe closely any change which occurred in this pathology during the period of observation. Throughout the study careful notation was made of any pathologic change which occurred.

At the conclusion of the period of study, i.e. twenty-four months after the first examination was made, 50 of the 110 subjects (or 45.5 per cent.) showed no change in pelvic findings. In the 60 subjects in whom some changes were observed, the greatest change was in those of the 51 subjects in whom cervical erosion had been present at the initial examination. Fourteen had no cervical erosion and 17 showed less erosion at the end of the period of study. The cervical erosion was unchanged in the other 20 subjects. There was no increase in severity of the erosion in any case nor did any cervical erosion develop in a subject who had not had the lesion at her initial examination.

There was no evidence of any irritation of the cervix or vagina by the tampon.

No subjects acquired Trichomonas or Monilia albicans infections during the period of study. There was no evidence of any other pelvic infection during this period.

There was no evidence that the use of the tampon caused obstruction to the menstrual flow.

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direct traction as far as possible in the axis of that part of the birth canal through which the head is passing." Is it not a mistake to create the impression that this teaching is out of date and that axis traction is only "of academic and historical interest rather than of living practical value"? Even if we allow the doubtful proposition that the high-forceps operation has no place in modern obstetrics, is the corollary relating to axis traction to be truly derived from it?—I am, etc.,

Greenock, Renfrew. JAMES BAXTER.

REFERENCES

[1] De Lee, J. B., and Greenhill, J. P., *Principles and Practice of Obstetrics*, 1943, London, p. 184.
[2] Eden, T. W., and Holland, E., *Manual of Obstetrics*, revised by Brews, A., 1948, London, p. 720.

Sciatic Paralysis in Newborn Infants

SIR,—We have read with interest the article by Drs. F. P. Hudson, A. McCandless, and A. G. O'Malley on "Sciatic Paralysis in Newborn Infants" (January 28, p. 223) and also the annotation on the subject in the same issue (p. 237). We wish to draw attention to an error in the description of the blood supply to the lower limb in the foetus. The authors state that the main artery to the lower limb is the sciatic and that this is replaced *after birth* by the femoral. The facts are that the sciatic is the main or axial artery in embryos of 6 mm., but the femoral has replaced it as the major blood supply of the limb in embryos of 22 mm.[1] Thus the essential vascular pattern of the adult is already established by the seventh week of development. Persistence of a sciatic artery of large size is a rare anomaly, and when present does not replace the normal femoral artery.[2]—We are, etc.,

J. W. MILLEN.
J. DAVIES.

REFERENCES

[1] Senior, H. D., *Amer. J. Anat.*, 1919, **25**, 55.
[2] Finerty, J. C., *Anat. Rec.*, 1947, **98**, 587.

Authors and Psychopaths

SIR,—It was with very much pleasure that I read the interesting and stimulating article by Dr. W. Russell Brain (December 24, 1949, p. 1427), and also the subsequent correspondence. Dr. I. Atkin (January 21, p. 186) believes that Freud's conclusion is all important, briefly that artistic and productive ability are intimately connected with sublimation. Is there really much evidence for this? The artist as a whole believes in free expression in his way of life, as is often expressed in his clothing, his outlook on sex, and in his work. I cannot agree that repression results in sublimation in the artist; it is rather his excess of vitality, energy, and sensitivity from the outset.—I am, etc.,

London, W.C.2. SIDNEY SHAW.

SIR,—Genius, as so admirably pointed out by Dr. W. Russell Brain (December 24, 1949, p. 1427), is a resultant of inner tensions. But these tensions need not be pathological. They may lead to, but are not necessarily caused by, pathological states. I feel I cannot agree with Dr. Russell Brain that we are on firmer ground if, in an analysis of the kind he undertook, we stick to descriptive psychiatry. Indeed, the book by Mr. Edmund Wilson, *The Wound and the Bow*, which Dr. Russell Brain cites, could not have been written without some good knowledge of psychodynamics, as discovered by the psychoanalytic schools. Mr. Wilson in his studies in literature skilfully uncovers the wound (*Lebenswunde*) which in each of his studies determines mental development and becomes responsible for the bow, which appears as a symbol not only of compensatory aggression but of magic power as well, as shown in the case of Philoctetes.

This, in Mr. Wilson's analysis, is also Dickens's story. The desolate island where Philoctetes was cruelly abandoned by the Greek leaders becomes the dirty, rat-infested blacking warehouse, where the young gentleman Charles was sent to work in humiliating circumstances. From this starting point, from an early traumatic experience, from loss of love (an inverted Oedipus complex) Mr. Wilson follows up the life and work of Charles Dickens and the development of what Dr. Russell Brain describes as sado-masochism. This term is not used by Mr. Wilson. Only once, when he refers to Dickens's later work, he relates an incident "betraying a kind of sadism which we never felt in his early work." There is no hint at a sexual or psychosexual perversion. In the light of the later Freudian teachings Dickens's sado-masochism would have to be described as destructive impulses, psychologically determined, greatly growing in strength at a critical period of his life, and towards the end of it directed against himself as well. Analysed along Freudian and Adlerian lines, as certainly intended by Mr. Wilson, the emphasis in Dickens's case would not be on a constitutionally determined diseased state, as Dr. Russell Brain's description may well lead us to believe, but on a truly psychoneurotic condition reinforced by cerebral arteriosclerosis.—I am, etc.,

London, N.W.11. B. C. SAALER.

*** This correspondence is now closed.—ED., *B.M.J.*

A Scientific Society

SIR,—On reading Lord Russell's Lloyd Roberts Lecture (December 10, 1949, p. 1307), I am driven to the conclusion that the lecturer has made an important error in logic—a conclusion which, on the face of it, would seem to be so unlikely as to verge on the impossible, when one considers the status of the lecturer in the realm of logic and philosophy. But here are the facts, which anyone can verify.

1. The lecturer states that he is not considering whether it is better for society to be stable or unstable; that, he says, is a question of values and (as such) lies outside the scope of (this) scientific discussion.
2. The lecturer proceeds to examine the question at issue under the headings "Physical," "Biological," and "Psychological."
3. The lecture is full of statements of value (inevitably, it seems to me), and some of those statements are subtle implications from assumed, but not specifically stated, values.
4. We have then a situation in which the lecturer is apparently convinced that his arguments are free from any unrecognized questions of value, in spite of the fact that he necessarily discusses the very driving forces of human life, and the argument bears the outward semblance of detached cerebration. (It was possibly this apparent detachment from human values which stimulated Mr. John Tester to write his letter (December 31, 1949, p. 1530)).

It seems to me that Lord Russell has committed an error which is only too common among ordinary people of lesser intelligence. To put it as precisely as I can, I should describe it as the error of failing to realize that our outlook and our reasoning are inevitably deeply coloured by the prevailing cultural and economic tenets of the social and physical environment in which we live. It follows that none of us can be non-political, unbiased, non-ethical; nor can we argue scientifically without values.

To a cultivated intellectual it may appear that recent events in China and the East present the crude and brutal spectacle of primitive peoples striving blindly for more belly fodder. He may be incapable of appreciating that the fundamental human values also are involved when an oppressed and ignorant people begins to stand up, throw off corruption, and breathe more freely. Nor may he appreciate that the driving forces of American prosperity present the same dual aspect—belly fodder and spiritual freedom. Instead, American and European civilization (assumed to enshrine the highest values) are thought to be in imminent danger of destruction by the barbarous East.

Surely Lord Russell's statement that "a society is not stable unless it is on the whole satisfactory to the holders of power and the holders of power are not exposed to the risk of successful revolution" is more typical of the approach of a Western industrialist rather than that of a social philosopher. If one manages to emerge momentarily from the blinkers of our contemporary "civilization," one can rewrite that sentence as follows: "A society is not stable unless it is on the whole satisfactory to the electors of the holders of power." The change in emphasis is fundamental. Stability in Lord Russell's statement depends upon (1) satisfaction of the values of the rulers, and (2) sufficiently strong rule to eliminate the risk of successful revolution. As a matter of observable fact stability depends upon the fulfilment of elementary values in the life

of the ordinary man. Fifty years ago such fulfilment was regarded as a pious hope, impracticable of realization. To-day it is seen to be the necessary condition of any would-be stable society. Mr. Tester is really stating this same principle in his letter.—I am, etc.,

London, N.W.3. A. F. MOHUN.

*** This correspondence is now closed.—ED., *B.M.J.*

The G.P. and E.C.T.

SIR,—My attempt (October 29, 1949, p. 984) to elicit the views of my fellow G.P.s anent the long-term values of E.C.T. appears to have been a nearly complete failure—which is a pity, as the subject seems to have been of some importance, and letters have reached me from the United States and from South Africa. In the main the letters from psychiatrists have shown what we already know, that many of them take a most optimistic view of the beneficial effects of this hazardous and unpleasant form of treatment.

Dr. Feldmesser's letter (December 10, 1949, p. 1356) indicates the frame of mind which I find disquieting. He appears to argue that because cases have not been sent back to him, therefore he has cured them. This begs the whole question. In my experience one cannot persuade patients to return to any centre for further treatment. Perhaps I have been unlucky. Dr. Feldmesser can be certain that I am only if he sends a follow-up questionary to all doctors whose patients he has treated up to twelve months ago.

I continue to believe that useful opinion on this difficult question can be based only on the sort of data that G.P.s could give.—I am, etc.,

Launceston, Cornwall. DONALD M. O'CONNOR.

*** This correspondence is now closed.—ED., *B.M.J.*

D.P.H. (London), 1929–39

SIR,—We are most anxious to get into touch with all old students of the London School of Hygiene and Tropical Medicine who attended the D.P.H. classes between 1929 and 1939. We have already sent a letter to those whose addresses we could find, but there are many that we have been unable to trace. We should be most grateful if all old students, whether they are at home or abroad, who took the D.P.H. courses between 1929 and 1939 and who have not yet received our letter would write to Dr. Windle Taylor, 51, Woodside Avenue, London, N.10, giving their addresses.—We are, etc.,

A. H. GALE.
G. E. GODBER.
E. PEREIRA.
T. STANDRING.
E. WINDLE TAYLOR.
ANN MOWER WHITE.
S. L. WRIGHT.

Princess Tsahai Memorial Hospital

SIR,—I shall be grateful if you will allow me to appeal to the generosity of your readers for donations to buy the surgical instruments required to complete the equipment of the main operation theatre of the Princess Tsahai Memorial Hospital in Addis Ababa. The sum required for this purpose is £3,500; it would carry the hospital a substantial stage further towards the opening, which it is now hoped will take place at an early date.

Dr. Neville Goodman, late director of field services of the World Health Organization, in a letter to the *Lancet* (December 31, 1949, p. 1243) has testified to the urgent need of the Princess Tsahai Memorial Hospital for the treatment of patients, and particularly as a training centre for nurses, which forms an essential part of the object for which the memorial hospital has been established. The systematic training of fully qualified hospital nurses has still to be initiated in Ethiopia. By praiseworthy efforts during the years which have elapsed since the country was liberated with British aid in 1941 the Ethiopian education department has prepared a number of young people for hospital training. Funds for this are in sight, once the hospital is open.

There can be few objects more worthy of aid from a country like ours, so well supplied with medical and nursing services, than help to a country which has suffered sorely under aggression and has but the most rudimentary health service. This effort to aid Ethiopia and to keep green the memory of the young Princess who in her five years of exile here devoted herself to the nursing and tender care of British patients, will be received in her country with great gratitude and will redound to the honourable record of this country. Cheques and postal orders, which will be very gratefully acknowledged by the Honorary Treasurers, Lord Horder and Lord Amulree, should be drawn in favour of the Princess Tsahai Memorial Hospital and addressed to the Hon. Treasurers, c/o Messrs. Gould and Prideaux, the Hon. Chartered Accountants, 88, Bishopsgate, London, E.C.2.—I am, etc.,

WINSTER,
Chairman,
Princess Tsahai Memorial Hospital

POINTS FROM LETTERS

Unhealthy Offices

Dr. GEORGE DE SWIET (London, W.10) writes: I have reason to suspect that a number of commercial establishments do not provide their office staffs with reasonably comfortable accommodation. . . . and the object of my letter is to find out what we can do about the indifference of those responsible for such administration and hygienic lapses. Is it the duty of the M.O.H. or of the factory inspector to investigate and to correct the faulty state of affairs? For it can only be someone endowed both with power and independence who might intervene with any hope of real success. The firm's own medical advisers (where there are any) could hardly be expected to be so quixotic. The employee's own doctor can only act incognito, otherwise the identity of the complainant would have to be divulged, thus creating an embarrassing situation resulting possibly in dismissal or forced resignation. That the present policy (where in operation) is short-sighted would appear obvious to anyone except those who suffer by it most—namely, the business firms concerned, whose staffs are frequently depleted through interminable colds, headaches, etc. But my appeal is not so much concerned with business efficiency as with the state of the nation's health, which, though we are told it was never better, still leaves something to be desired. We as a profession must fight not only for better home conditions for our patients but also for better working conditions for them to a much greater degree than heretofore.

The Ageing Population

Dr. D. S. BRYAN-BROWN (London, N.16) writes: When the registrar sent for my last death-certificate book I looked through the counterfoils. There were 32 in all from 1944, and, like Dr. J. Finlay Alexander (January 28, p. 252), I found the ages of decease very striking. Doubtless they are statistically of no significance, but they may be of human interest. The practice is largely in the Metropolitan Boroughs of Hackney and Stoke Newington and is middle and working class. None of the 32 patients whose deaths are recorded was under the age of 65. The oldest was 96, and the average age at death was 79.75 years. These patients have died at home or in nursing-homes, and do not include deaths in hospital.

Measles and Bronchopneumonia

Dr. J. F. B. HILL (London, E.10) writes: The recent very cold weather, starting as it did during an outbreak of measles, rendered the development of bronchopneumonia more likely than is usually the case. Working in general practice, I have found it advisable to give prophylactic sulphonamides to all cases of measles with an increased respiration rate or a bad cough. Judging by the quick improvement in symptoms, I am sure that I have prevented at least a few cases of bronchopneumonia.

Chilblains

Dr. A. N. MELVIN (Burley-in-Wharfedale, Yorkshire) writes: During November I developed chilblains on both ears. I could not refrain from rubbing them in the evenings and developed "broken chilblains" despite the fact that I took vitamin D and nicotinic acid. I went to Switzerland for two weeks in late December when the temperature was below freezing all the time. The chilblains cleared up in five days.

Failed Forceps

Dr. MABEL F. POTTER (Bristol) writes: In answer to Dr. Austin H. Holmes (December 31, 1949, p. 1528) a short article by me on persistent occipito-posterior cases was published in the *Medical Press and Circular* (1945, **213**, 237).

Obituary

R. P. RANKEN LYLE, M.D., D.Ch., F.R.C.O.G.

Professor Ranken Lyle, who was professor of midwifery at the University of Durham for over twenty-five years, died on February 1 at the age of 79.

Robert Patton Ranken Lyle was born in 1870 in Coleraine. He was a student at Trinity College, Dublin, where he graduated in 1894, proceeding M.D. two years later. He was an assistant master at the Rotunda Hospital before coming to Newcastle in 1899 as a lecturer in midwifery and diseases of women. He was appointed professor in these subjects in 1908. At that time gynaecological cases were dealt with by the physicians and by the general surgeons. Professor Lyle bought a house at the gates of the Infirmary, which he equipped and ran as the Samaritan Free Dispensary for Women. There he performed a large number of operations, including many abdominal operations, and this led to his being appointed gynaecologist to the Royal Victoria Infirmary. The very small maternity hospital, which had only fifteen beds, was quite inadequate for the needs of such a large centre, so Lyle took over a large industrial school and equipped it as a modern maternity hospital with over ninety beds, which was opened in 1923 by the Princess Royal. A public appeal for support met with a very poor response. In spite of this he bought another large house in the city and converted it into a maternity home for women of moderate means. Both of these projects were financially backed by Professor Lyle in the first instance and were ultimately self-supporting.

In all his dealings Lyle was good-humoured and the soul of generosity. As a chief he was kindness personified in all his contacts with his subordinates. He was a most careful and skilled operator and he abhorred fancy gadgets; he seldom used a retractor even in the most difficult pelvic operations. Professor Lyle was in advance of his early contemporaries in deprecating the many operations for the treatment of displacements of the uterus. He ridiculed, too, the all too prevalent idea that backache was due to uterine retroversion. He was always blunt and forthright in his teaching. For example, he would say that the uterine sound had only three uses; to procure abortion, to perforate the uterus, and to introduce sepsis. An interesting feature of his teaching was his insistence on examining a gynaecological case from above downwards, and not, as so many tended to do, from below upwards. He emphasized the importance of making a thorough general examination before attempting a detailed examination of the pelvic organs.

Professor Lyle was popular with his students and with his colleagues, and a prize in clinical midwifery is now associated with his name. In 1921 at the annual meeting of the British Medical Association he was president of the Section of Obstetrics and Gynaecology. His main hobbies were stamp-collecting and shooting. On his retirement from the chair in 1935 he was appointed emeritus professor in midwifery and gynaecology. The University also conferred on him the honorary degree of doctor of surgery. For a number of years he was a J.P. for the City of Newcastle, and he was president of the Tyneside Irish Fellowship. A fracture of the femur due to a fall some years ago contributed much to the ill-health which marred his declining years. The University of Durham owes much to his forceful personality and character, and there is no doubt that he will be greatly missed. He leaves a wife and a daughter.

JOAN DURHAM TRETHOWAN, who died on December 1 at the age of 53, was the daughter of Godfrey and Ellen Hickson. Her grandfather was Arthur Edward Durham, surgeon to Guy's Hospital. In 1916 she married Mr. William Henry Trethowan, orthopaedic surgeon to Guy's Hospital. She had two sons, both of whom qualified from Guy's. After her first husband's death in 1934, Joan Trethowan herself studied medicine at the Royal Free Hospital, and she qualified in 1943. She then held a number of house appointments, including posts at the Royal Devon and Exeter Hospital, the Brompton Hospital, and Benenden Sanatorium, where her chiefs found her outstandingly dependable and popular with both patients and nursing staff. In 1945 she married Dr. Leslie Norman Trethowan, her nephew by marriage, who is also an old Guy's man. These facts give the mere outline of an exceptional life. Joan Trethowan had the elegant education of a young lady born at the end of the last century. She married at the early age of 20, and lived a very full life as wife, parent, and close assistant in every way to her brilliant husband. It is remarkable that, when over 40, she should have had the courage and determination to start a new career, learning elementary algebra and science in order to pass the special entrance examination to London University. She was held in great affection by her fellow students, most of whom were of the same age as her own sons. Her vitality and youthful spirit carried her through the ardours of medical study during the early years of the recent war. Her first grandchild was born just a week before she took her finals. Joan Trethowan delighted in living in the country, and the last year of her life was extremely happy. With her husband she made a new home near Dartmoor, where she enjoyed from time to time the company of her sons, grandchildren, and friends. Her untimely death is a great grief to her many friends—and because of her outstanding integrity, wisdom, and sympathy her friends are very numerous, and widely scattered in age and mode of life. She will be remembered with admiration and affection by "Treth's" colleagues, students, and patients at Guy's Hospital and the Royal National Orthopaedic Hospital, as well as by all those who had the privilege of being associated with her in medicine and friendship. —M. K.

Dr. WILLIAM EDLUND LAWRENCE ALLEN died at his home in Hawkshead on January 9 at the age of 84. Born at Carham on the Tweed, he was the fourth son of the Rev. J. Allen, and went to live in Hawkshead in 1876 when his father was appointed vicar there. He was educated at Hawkshead Grammar School, where Wordsworth had been a pupil, and at Glasgow University. He graduated M.B., C.M. in 1888. After a period as house-surgeon at the North Lonsdale Hospital, Barrow-in-Furness, and as an assistant in Manchester, he returned to Hawkshead in 1891. He moved to Ambleside five years later, but retained his interest in Hawkshead and finally returned there in 1929, retiring from practice only in 1945. While at Ambleside Dr. Allen was divisional surgeon and founder of the St. John Ambulance Brigade there, and for his services was appointed a Serving Brother of the Order of St. John in 1927. He was also chairman of the Ambleside Urban District Council for a time. He was police surgeon for the Hawkshead area, and during the war was medical officer for No. 1 Prisoner of War Camp at Grizedale Hall. In 1893 he married Annie Beatrice Henshaw, of Liverpool, who survives him with one son and three daughters, one of them following her father's profession.—A. D. G.

Dr. EDWARD REGINALD STANISLAS SWEENEY, who died on January 16 in St. Mary's Hospital, Paddington, after only a few days' illness, was 54. He had been in practice for over twenty-five years in Notting Hill, where he was one of the best-known and best-liked practitioners in the district. He devoted himself to the care of his many patients, and children in particular liked him and would do anything for him. Dr. Sweeney was a student at St. Mary's Hospital, where he qualified in 1923. He was captain of the St. Mary's hockey team and was also a keen football player. During the 1914–18 war he had served in Mesopotamia, and in the 1939–45 war he was

in charge of a civil defence mobile unit in North Kensington. Dr. Sweeney, who will be sadly missed by his patients, his colleagues, and his many friends, was a well-known freemason. He is survived by one son and two daughters.

Medico-Legal

FITNESS TO PLEAD

NORFOLK MURDER TRIAL

There were several unusual features in a case heard before Mr. Justice Stable at Norwich Assizes on January 27.

James Frank Rivett, a bricklayer's labourer aged 21, was found guilty of the murder of a 17-year-old schoolgirl, Christine Ruth Cuddon, of Beccles, Suffolk.[1] The girl, who was said to have distinguished herself in her studies at the Sir John Leman School, was found strangled with her own scarf in a cycle shed at the school.

A week previously a jury at Suffolk Assizes had found Rivett sane and fit to plead. The issue of Rivett's sanity was raised again, however, as soon as he appeared in the dock. Mr. Justice Stable asked the jury to consider whether he was unfit to plead. Two prison medical officers then gave evidence.

Dr. J. C. M. Matheson, of Brixton Prison, said he had frequently spoken to Rivett, and he expressed the opinion that he was certifiably insane. "Although he can recount events, he cannot apply his mind to his present position, and he is careless and apathetic." Dr. Matheson went on to say that Rivett would not be able to understand fully the proceedings, nor to instruct his counsel properly. He did not think Rivett would be able to challenge a juror. In his view Rivett was suffering from schizophrenia. He would have done what he did even if a policeman had been standing by his side. Rivett, in conversation with him, had given no motive, and all he would say was that the idea came to him suddenly. Dr. Matheson concluded his evidence by saying: "In my opinion there was a disease of the brain on November 5. I am prepared to certify him now."

Dr. Basil Tracey, who had seen Rivett at Norwich Prison, said that he, too, was quite prepared to certify Rivett as insane. He told the court: "I think he knew he was killing the girl, but he did not realize the seriousness of it." Dr. Tracey also said: "He has told me that he does not mind if he does die or is executed. He says in a light-hearted way that he does not want to serve a long sentence, and he says he would do somebody else in to make sure."

The jury then retired for seven minutes and returned to announce Rivett "sane and fit to plead." Mr. Justice Stable described their verdict as a sensible one.

A new jury was then sworn in, and Mr. Granville Sharp, for the Crown, outlined the prosecution's case. Christine Cuddon had associated with Rivett for about four years, and her parents had asked her to choose whether she would carry on her training as a teacher or continue this undesirable association. She promised to carry on with her scholastic career. On November 5 she went to a cinema and apparently met Rivett by arrangement. Later that evening Rivett went to the Beccles Police Station, where he was alleged to have said: "You had better lock me up. I have just killed a girl. It is right. I am not kidding. I strangled her." A police officer would tell the jury that at that time Rivett seemed composed, sober, and unexcited. A long statement alleged to have been made by Rivett was then produced. It described how he had tied the girl's scarf round her neck and pulled it tight. Then to make sure he twisted the scarf round her neck again and tied it again.

A cousin of the accused said that three years ago he had told her he would never be married because he would commit murder and be hanged for it. He had said on two other occasions that he would commit murder, but she did not think he was serious.

Dr. Matheson and Dr. Tracey again gave evidence for the defence. They were followed by Dr. Louis Rose, who said that Rivett had been preoccupied with an ill-formed fantasy of murder and his own self-destruction before this case.

Rivett had at first answered the charge before the new jury with a plea of "guilty." Sir Charles Doughty, for the defence, said: "You have heard this man plead guilty to the charge. He does not want to get off." He was pleading against the capital sentence against the will and the instructions of Rivett himself. The jury then retired and reached its verdict after nearly two hours.

In his summing up Mr. Justice Stable had referred to "that mysterious and incomprehensible machine of the mind." He asked the jury to remember the difference between "mad" and "bad." He said that apart from the evidence of the cousin there was no evidence of any family history of mental abnormality. After donning the black cap and pronouncing the death sentence, at all of which Rivett smiled, the judge went on to say: "I am satisfied that the contribution the jury system makes to the administration of criminal law is invaluable."

[1] *Manchester Guardian, Daily Telegraph*, January 28, 1950.

Universities and Colleges

UNIVERSITY OF OXFORD

In a Congregation held on January 19 the following degrees were conferred:

B.M.—R. O. H. Heape, J. P. Johnston.

UNIVERSITY OF CAMBRIDGE

In Congregation on January 28 the degree of M.A. was conferred on Arthur Leslie Banks, M.D., F.R.C.P., D.P.H., Professor of Human Ecology in the University.

The following medical degrees were conferred in Congregation on January 28:

M.D.—J. P. D. Mounsey, O. Clarke, D. G. Abrahams, P. H. Nash, R. A. Murray Scott.

M.B., B.CHIR.—*M. Rayne, *G. C. Hoffman, *A. C. Gibson, *M. J. Hunter, *A. K. Knowles, *J. P. Lythgoe, *P. R. Thomson, K. M. McFadyean, A. McGregor, *J. P. Lester, *J. G. Elliott, *P. W. Sole, R. G. Beard, *R. E. Eban, *G. H. Bond, *T. M. D. Gimlette, *P. J. Roffey, *R. C. Shepherd, *V. H. Smith, *J. T. B. Stewart, S. J. Crews, G. H. J. Dickinson, M. P. Goodson, A. S. Law, *D. B. Cathcart, *J. W. H. Elder, *D. C. H. Garrod, *G. F. Hargreaves, *D. Hilson, *J. C. A. Raison, E. J. C. Wynne, *H. M. C. Corfield, *J. G. B. Myles, *J. L. R. Barlow, *J. O. Seville, *G. F. Jolly, *H. Wainstead, *D. J. D. Perrins,* K. F. Robinson, J. D. J. Havard, *M. Marshall, *I. H. Seppelt, *M. J. Smith, *J. F. Trunchion, D. S. Eastwood, *A. G. Ackerley, *M. J. Ball, *G. R. C. Fisher, *D. D. La Touche, *P. D. S. Thomas, *J. D. W. Tomlinson, *R. H. R. White, *M. B. S. Cooper, *J. C. Turner, *D. F. Richards, *Olwyn K. Thomas, *P. Elliott, *D. H. Nixseaman.

*By proxy.

UNIVERSITY OF LONDON

A course of three lectures on "Statistical Problems Connected with Medical Diagnosis" will be delivered by Professor Jerzy Neyman, Professor of Mathematics and Director of the Statistical Laboratory in the University of California, at University College (Eugenics Theatre), Gower Street, W.C., on Mondays, February 27 and March 6 and 13, at 5.30 p.m. The lectures are addressed to students of the University and to others interested in the subject. Admission is free, without ticket.

UNIVERSITY OF MANCHESTER

The title of Professor W. F. Gaisford will in future be that of "Professor of Child Health and Paediatrics and Director of the Department of Child Health."

The following appointments are announced: *Honorary Special Lecturer in Pathology*, James Dawson, M.B., B.S.; *Lecturer in Neurosurgery*, G. K. Tutton, F.R.C.S.; *Lecturer in Venereal Diseases*, Robert Lees, M.D., F.R.C.P.Ed.; *Clinical Lecturer in Prosthetics*, Harry McIntyre, M.B., Ch.B., B.D.S., L.D.S.; *Assistant Lecturer in Radiology*, G. B. Locke, M.B., Ch.B., D.M.R.D.; *Assistant Lecturer in Gynaecological Pathology*, A. S. Woodcock, M.B., Ch.B.; *Reader in Rheumatic Disease and Clinical Director of Chronic Rheumatism Centre*, J. H. Kellgren, F.R.C.S.; *Reader in Obstetrics and Gynaecology*, C. Scott Russell, F.R.C.S.Ed., M.R.C.O.G.; *Lecturer in Surgery*, R. P. Jepson, F.R.C.S.; *Assistant Lecturer in Orthopaedic Surgery*, J. K. Wright, M.B., Ch.B.

UNIVERSITY OF WALES

The following candidates for the degrees of M.B., B.Ch. at the Welsh National School of Medicine have satisfied the examiners at the examination indicated:

SURGERY.—Marjorie J. Adams, D. F. Brown, Josephine J. Candy, D. E. Copas, Lilian J. Cunningham, B. M. Davies, Ilid M. L. Davies, J. M. S. Dixon, *J. L. A. Dowse, D. R. T. Evans, J. Evans, B. M. Frost Smith, B. J. Fudge, S. G. Gang, Nansi G. Gwynne, H. B. Jenkins, *J. Magell, W. B. Morgan, E. D. Morris, G. J. Moses, D. Phillips-Miles, Elizabeth M. M. Price, H. M. N. Rees, Esther H. Thomas, Margaret E. Thomas, Margaret H. J. Thomas, Anne G. Tighe. *With distinction.

ROYAL COLLEGE OF PHYSICIANS OF IRELAND

The following were admitted to the Membership of the Royal College of Physicians of Ireland on February 3: D. C. R. Burrows, J. G. Kidney, D. McCarthy, W. H. McDaniel, R. M. Pritchard, W. M. O. Purcell, W. J. S. Wilson.

ROYAL COLLEGE OF OBSTETRICIANS AND GYNAECOLOGISTS

At a meeting of the Council of the College, held on January 28, with the President, Professor Hilda Lloyd, in the chair, William Wellesley Wilson (Hobart, Tasmania) was admitted to the Fellowship of the College.

The following were elected to the Membership of the College: J. A. Bentham, D. W. Briggs, H. McK. Carey, Florence J. G. Chouler, R. Crawford, R. Cutts, T. Dean, M. S. Ellensweig, H. J. Fisher, Elizabeth M. Harper, W. F. Harper, J. S. Hesketh, P. Kalyanikutty, Sarah Macaskill, A. S. Majury, A. T. Marshall, J. D. Martin, J. G. Napier, F. P. Pigott, J. H. McK. Pinkerton, C. C. Pretorius, S. Rajanayagam, T. M. Roulston, S. A. Scorer, A. H. A. Shabanah, A. C. Sinha, W. A. Souter, A. Starritt, G. Winchester.

EPIDEMIOLOGICAL NOTES

Discussion of Table

In *England and Wales* there were increases in the notifications of scarlet fever 265, whooping-cough 218, and dysentery 23, with a decrease in the incidence of acute pneumonia 101.

A small rise in the incidence of scarlet fever was recorded in most parts of the country; the largest was 46 in Yorkshire West Riding. No appreciable change was recorded in the local trends of diphtheria.

The largest increases in the notifications of whooping-cough were Worcestershire 32 and London 29. The largest variations in the local incidence of measles were a fall in Durham 54 and a rise in Norfolk 41.

The chief centres of dysentery were: Yorkshire West Riding 28 (Sheffield C.B. 19, Leeds C.B. 5); Northumberland 26 (Newcastle-upon-Tyne C.B. 22); Nottinghamshire 25 (Nottingham C.B. 25); London 25 (Chelsea 13, Islington 6); Lancashire 18 (Liverpool C.B. 8, Blackburn C.B. 5); and Essex 12 (East Ham C.B. 8); Durham 11.

In *Scotland* there were increases in the notifications of whooping-cough 65, scarlet fever 20, and diphtheria 12. Notifications of acute primary pneumonia were 111 fewer than in the preceding week. The rise in the incidence of scarlet fever was mainly confined to the south-eastern area. An outbreak of diphtheria with 6 cases was notified in the city of Dundee. The largest incidence of dysentery was in Glasgow 21 and Dundee 9.

In *Eire* a rise was reported in the notifications of scarlet fever 33 and whooping-cough 27, with a decrease of 34 in the incidence of measles. A rise in the notifications of scarlet fever was general throughout the country. An outbreak of whooping-cough with 22 notifications was reported from Donegal, Donegal R.D.

In *Northern Ireland* notifications of scarlet fever decreased by 27 and notifications of whooping-cough rose by 34. Notifications of measles have been the same for three weeks. The rise in the incidence of whooping-cough was mainly due to the experience of County Down, where the notifications rose from 13 to 67.

Week Ending January 28

Notifications of infectious diseases in England and Wales during the week included: scarlet fever 1,966, whooping-cough 1,764, diphtheria 88, measles 2,532, acute pneumonia 902, acute poliomyelitis 60, dysentery 149, paratyphoid fever 6, typhoid fever 7.

No. 3

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended January 21.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1950 (a)	(b)	(c)	(d)	(e)	1949 (Corresponding Week) (a)	(b)	(c)	(d)	(e)
Meningococcal infection	45	4	19	—	—	28	1	30	3	1
Deaths		1	—				—	—		
Diphtheria	74	7	30	1	5	92	11	34	6	5
Deaths	1	—	—	—	—	—	—	—	—	—
Dysentery	177	25	52	—	—	70	27	37	—	7
Deaths					—				—	—
Encephalitis, acute	4	—	—	—	1	2	—	—	—	1
Deaths		—		—			—			
Erysipelas			35	10	5			37	7	2
Deaths										
Infective enteritis or diarrhoea under 2 years				17					32	
Deaths	27		2	—	—	42	3	11	3	1
Measles*	2,334	36	50	53	219	10,922	320	108	57	151
Deaths†			—	—	—			—	1	—
Ophthalmia neonatorum	50	1	8	—	—	48	8	9	—	—
Deaths										
Paratyphoid fever	1	—	—	—	—	4	1	—	—	—
Deaths	—	—	—	—	—	—	—	—	—	—
Pneumonia, influenzal	890	68	19	2	9	1,184	65	12	8	14
Deaths (from influenza)‡	39	5	5	—	—	40	8	8	1	1
Pneumonia, primary			328	¶				488	43	
Deaths	233	36		18	14	365	53		16	11
Poliomyelitis, acute	51	3	1	7	—	37	4	1	—	—
Deaths§	3	—		—		2	—			
Puerperal fever		—	2				—	5		
Deaths										
Puerperal pyrexia‖	88	14	10	—	2	88	6	7	—	1
Deaths							—			
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	2,023	117	281	95	135	989	67	273	100	44
Deaths†			—	—	—			—	—	—
Smallpox	—	—	—	—	—	—	—	—	—	—
Deaths				—	—				—	—
Typhoid fever	5	—	—	3	—	5	—	1	3	—
Deaths	—	—	—	—	—	—	—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths				—	—				—	—
Whooping-cough*	1,753	88	424	77	101	2,825	172	304	67	61
Deaths	4	2	—	—	—	6	1	1	—	—
Deaths (0–1 year)	311	39	34	14	12	365	46	75	24	13
Deaths (excluding stillbirths)	5,282	828	653	226	125	6,215	956	869	239	155
Annual death rate (per 1,000 persons living)			13·1					17·5	14·8	
Live births	7,121	1107	896	341	209	7,636	1224	972	422	220
Annual rate per 1,000 persons living			18·0					19·6	26·2	
Stillbirths	178	25	19			179	20	44		
Rate per 1,000 total births (including stillborn)			21					43		

* Measles and whooping-cough are not notifiable in Scotland, and the returns are therefore an approximation only.

† Deaths from measles and scarlet fever for England and Wales, London (administrative county), will no longer be published.

‡ Includes primary form for England and Wales, London (administrative county), and Northern Ireland.

§ The number of deaths from poliomyelitis and polio-encephalitis for England and Wales, London (administrative county), are combined.

‖ Includes puerperal fever for England and Wales and Eire.

¶ Primary pneumonia no longer notifiable in Eire.

Medical News

Retired from WHO

Dr. Raymond Gautier, Assistant Director-General of the World Health Organization, has retired from that post and will become Research Director for the International Children's Centre in Paris. Born in 1885, Dr. Gautier qualified at the University of Basle, where he remained until 1919 as Assistant in the Institute of Pathological Anatomy. In 1921 he became First Assistant in the Physiology Laboratory in the University of Geneva, later moving to the Institute of Hygiene and Bacteriology there, where he became Chief of Operations. At this time he received the Bizot award for his work on the blood–C.S.F. barrier. He remained there until 1925 doing original research on bovine fluorosis. From 1926 to 1930 he was Director of the Eastern Office of the League of Nations Health Organization at Singapore. Returning to Geneva in 1930, he devoted the next eight years to studying biological standardization, and achieved international renown with this work. During the recent war he visited London and Washington in order to organize health measures in liberated Europe. When the Interim Commission of WHO was established in 1946, Dr. Gautier was appointed Counsellor, and later Director of the Geneva Office. In 1948 he became Assistant Director-General.

Deputy Lieutenant

Colonel J. F. O'Grady, of Swinton, Manchester, has been appointed a Deputy Lieutenant of the County Palatine of Lancaster.

Artificial Limbs

The Standing Advisory Committee on Artificial Limbs, which was set up in 1945 by the Minister of Pensions, has now issued its third report. The most important project under consideration in the past year has been the development of the suction-socket leg for above-knee amputees. The research department has also been concerned with the development of special appliances designed to enable amputees to carry on with their previous work. For example, appliances have been made for holding any type of spray-gun, for office and typing work, and for sewing and knitting, and even a simple piano-playing device has been supplied to some patients. A close liaison with the corresponding research centres in the United States and Canada, in Germany and in Denmark has been continued.

Mycological Reference Laboratory

Dr. R. W. Riddell has succeeded Dr. J. T. Duncan as director of this laboratory. Specimens for examination for pathogenic fungi should be addressed to the Director, Mycological Reference Laboratory, London School of Hygiene and Tropical Medicine, Keppel Street, London, W.C.1.

Lady Tata Memorial Trust

The trustees of the Lady Tata Memorial Fund invite applications for grants and scholarships for research in diseases of the blood, with special reference to leukaemia, in the academic year beginning October 1. Grants of variable amount are made for research expenses or to provide scientific assistants for senior workers. Scholarships are awarded as personal remuneration, and are intended chiefly for junior investigators working under suitable direction. Their normal value has been £400. Applications must be submitted before March 31, and the awards will be announced by the trustees in June. Further particulars and forms of application may be obtained by writing to the Secretary of the Scientific Advisory Committee, c/o Medical Research Council, 38, Old Queen Street, Westminster, London, S.W.1. The grants and scholarships are open to workers of any nationality, and in any country in which it will be possible to make payments in the coming academic year. The available information on this point, regarding particular countries outside the Sterling Area, will be supplied to intending applicants on request.

Austrian Conference on Rehabilitation

The first conference on medical or sociological subjects to be held in Austria since the war took place in Vienna from January 23 to 26, under the auspices of the Austrian Ministry of Social Affairs. It was presided over by Professor Philip Erlacher, chief of the Vienna Orthopaedic Hospital, and Dr. Fuchs, of the Austrian Ministry, and attended by over 300 delegates. Invited speakers from other countries included Dr. Howard Rusk, Adviser on Rehabilitation to the United Nations, and Dr. Harold Balme. There is growing interest in Austria in the rehabilitation and resettlement of the disabled, and it is proposed to develop at a former spa near Graz a rehabilitation and vocational training centre for 200 patients, including a special paraplegic unit.

Drug Addiction

A WHO committee on habit-forming drugs met recently to discuss their control and to advise the United Nations on problems connected with drug addiction. It considered particularly the international control of the new synthetic drugs.

Nuffield Fellowships

To help the advancement of dental teaching and research the Nuffield Foundation offers fellowships (1) to enable university graduates in medicine and science to receive training that will qualify them to undertake teaching and fundamental research in dental health and disease, and (2) to enable qualified dentists to receive additional training in pure and applied science for an academic career in dentistry. It is hoped that in particular medical men and women with qualifications in science will apply. Scholarships are also available to assist dental students of outstanding ability to spend one or two years on further study of the basic sciences. Applications for fellowships must be received by March 1, and for scholarships by June 30. Those serving in the armed Forces may apply now for fellowships tenable on demobilization. Applicants should write to the Secretary of the Nuffield Foundation, 12–13, Mecklenburgh Square, London, W.C.1.

Sims Commonwealth Travelling Professor

Sir Reginald Watson-Jones has left for the first of the three parts of his tour as Sims Commonwealth Travelling Professor of Surgery. He will be accompanied by Lady Watson-Jones, and will be in Canada in February and March. In Montreal he will make presentations from the president and the council of the Royal College of Surgeons of England to the Royal College of Physicians and Surgeons of Canada, including a presidential gavel carved by Sir Henry Souttar, former vice-president of the college, from a piece of teak rescued from the Hunterian museum after the fire-blitz of 1941. In the University of Toronto Sir Reginald will be guest-professor for a week, and will give a public address on "The Progress of a Half-Century in the Treatment of Fractures." He will work in the recently established medical school of the University of British Columbia, Vancouver, and will address the Vancouver Medical Society on "The New World of Surgery." Invitations have been accepted to deliver eighteen different addresses on surgical subjects in various parts of the continent, and he will visit the University of Manitoba, Winnipeg; the University of Edmonton; Queen's University, Kingston; the University of Western Ontario, London; Dalhousie University, Halifax; and the medical schools of Montreal, Ottawa, and Quebec. The second part of the tour, in April and May, will include Singapore, New Zealand, and Australia, with the annual meetings of the Royal Australasian College of Surgeons and the Australian Orthopaedic Association. The third tour, in the late autumn, will include the Central African Colonies, Rhodesia, and the Union of South Africa.

The American Heart Journal

Dr. Jonathan C. Meakins, formerly professor of medicine at McGill University, has been appointed editor of the *American Heart Journal*. The American Heart Association has started a new monthly journal entitled *Circulation*, and, as reported previously (October 15, 1949, p. 883), has ceased to sponsor the *American Heart Journal*. The latter periodical will devote more space than formerly to contributions on clinical subjects.

Diplomatic Privileges

Diplomatic immunities and privileges have been conferred on Dr. G. Brock Chisholm, Director-General of the World Health Organization, and on the following members of and advisers to the Executive Board of WHO: Dr. D. A. Dowling and Dr. E. R. Walker (Australia); Dr. Geraldo H. de Paula Souza (Brazil); Dr. N. Evstafiev (Byelorussian Soviet Socialist Republic); Dr. W. G. Wickremesinghe (Ceylon); Dr. W. W. Yung (China); Sir Aly Tewfik Shousha, Pasha (Egypt); Professor J. Parisot, Dr. D. Boide, Dr. R. Dujarric de la Riviere, Mr. M. A. Vaucel (General Inspector of Medicine), and Mr. Paul Bertrand (France); Sir Arcot L. Mudaliar (India); Dr. Mohamed Hossein Hafezi (Iran); Dr. José Zozaya (Mexico); Dr. Cornelis van den Berg, Dr. Jean-Jacques Brutel de la Rivière, Dr. W. A. Timmerman, and Dr. C. J. Goudsmit (Netherlands); Dr. Karl Evang (Norway); Dr. Boguslaw Kozusznik, Mr. J. Rudzinski, and Mr. M. F. Niemira (Poland); Dr. H. S. Gear and Mr. C. H. Taljaard (Union of South Africa); Dr. N. A. Vinogradov (Union of Soviet Socialist Republics); Dr. H. van Zile Hyde, Mr. A. Wolman, Mr. James F. Anderson, and Mr. Howard B. Calderwood (United States); and Dr. Andrija Stampar (Yugoslavia).

Problem Families

A film strip on the subject of problem families has been made in the Salford Health Department. A limited number of copies are available at the cost price of 7s. 6d. each. A script has also been prepared to assist those who may wish to give a talk accompanying the showing of the film strip. The strip illustrates the subject by showing some 50 "still" photographs on the problem of the prevention and cure of these families. Copies may be obtained on application (enclosing postal order for 7s. 6d.) to the Medical Officer of Health, Public Health Department, 143, Regent Road, Salford, 5.

Seafarers' Health

A joint committee of the World Health Organization and the International Labour Office is considering a suitable international form of medical record for seamen. The document would provide information for medical authorities anywhere in the world, and contain notes on the man's previous medical history and a record of his protection against various infectious diseases. The committee has recommended that men suffering from active pulmonary tuberculosis be prevented from signing on ships. Medical examinations of seafarers would have to be revised and standardized to achieve this, and the committee suggested that the problem be studied under the auspices of WHO. Measures for the international control of venereal disease should include an expansion of social welfare services.

COMING EVENTS

British Medical Students Association

The following arrangements have been made for the week February 13–21. *London Region.*—February 15: Visit to Messrs. William Warner and Co. *London Hospital.*—February 21: Lecture by Sir Hugh Griffiths on "The Injured Workman." *Birmingham.*—February 16: Lecture by Alderman Burnam on "Local Government Administration." *Belfast.*—February 17: Film show. *Manchester.*—February 14: Lecture by Dr. W. Brockbank on "History of Medicine." February 16: Lecture by Professor F. J. Nattrass on "Medicine in Our Time." *Sheffield.*—February 16: Lecture by Dr. Parish. February 18: General Election of Officers of Medical Society. *St. Andrews.*—Lecture by Dr. H. Pullar Strecker on "Alcoholism in Practice: Causation, Prevention, and Treatment." *Aberdeen.*—February 21: Student papers. February 14: Brains trust. February 21: Lecture by Dr. Neil G. C. Hendry. *Durham.*—February 17: Lecture by Mr. John Foster on "A Child's Guide to the Fundus."

French Scientific Instruments

An exhibition of French scientific instruments is being held at the Science Museum, South Kensington, until February 26, weekdays 10 a.m. to 6 p.m., Sundays 2.30 p.m. to 6 p.m., admission free. A large bilingual catalogue is on sale at 2s.

St. Thomas's Hospital Musical Society

This society will perform Mozart's "Requiem" on Tuesday, February 14, at 8.15 p.m. (the performance ending at about 9.30 p.m.), in St. Mary's Church, Bryanston Square, London, W.1. The conductor is Mr. Wilfrid Dykes Bower and the organist Mr. John Dykes Bower, D.Mus., organist at St. Paul's Cathedral. No tickets are needed.

Medical Films

The Royal Society of Medicine and the Scientific Film Association will hold a joint meeting on February 21 at 5.30 p.m. at 1, Wimpole Street, London, W.1, when "What Constitutes the Ideal Medical Film?" will be discussed. The openers are Professor MacDowall, Mr. Longland, and Dr. Ollerenshaw, and the chairman will be Sir Kenneth Goadby.

Christian Medical Fellowship

A meeting of the Christian Medical Fellowship will be held at the Royal Empire Society, Northumberland Avenue, London, W.C., on Tuesday, February 21, at 7.45 for 8.15 p.m., when Dr. D. Martyn Lloyd-Jones will speak on "The Christian Faith and Medicine." The chair will be taken by Sir James Paterson Ross.

Kellogg Lecture

Dr. William W. Mushin, of the department of anaesthetics, Welsh National School of Medicine, has been invited by the George Washington University, Washington, D.C., to give the Kellogg Lecture on "The Application of Physiologic Principles to the Management of the Unconscious Patient" on February 28.

The World's Food

The Association of Scientific Workers will hold a conference on "The World's Food and Britain's Needs" under the presidency of Lord Boyd-Orr, F.R.S., on March 4–5, at St. Pancras Town Hall, London. Speakers include Dr. Julian Huxley, F.R.S., and Sir R. George Stapledon, F.R.S. Full particulars may be obtained from the association at 15, Half Moon Street, Piccadilly, London, W.1.

Tuberculosis Refresher Courses

A refresher course on tuberculosis will be held at Davos, Switzerland, on March 25–April 2 if a sufficient number of applications are received for it. Courses on "Tuberculosis in Children and the Use of B.C.G." will be held in the Medical School at St. Thomas's Hospital, London, S.E.1, on April 18, 19, and 20. Visits to a London hospital and chest clinic will be arranged for April 21. Three-day clinical courses have been arranged as follows: *Cheshire Joint Sanatorium*: February 8–10; March 8–10; April 12–14; May 10–12. *King George V Sanatorium, Godalming*: February 21–23; May 10–12. Further information about all these courses can be obtained from the Secretary, Tuberculosis Educational Institute, Tavistock House North, Tavistock Square, London, W.C.1.

Anatomy Congress

An International Anatomical Congress will be held at Oxford on July 25–28 under the presidency of Professor W. E. Le Gros Clark, F.R.S. Sections are being planned to include the following subjects: general anatomy, histology and embryology, morphogenics and endocrinology, neurology, physical anthropology. Applications to attend should be sent as soon as possible, and not later than March 1, to the Congress Organizer, International Anatomical Congress 1950, Department of Human Anatomy, University Museum, Oxford.

Radiology

Courses for the Academic Postgraduate Diploma in Medical Radiology of the University of London will begin next October. Further information will be found in the advertisement columns.

SOCIETIES AND LECTURES

Monday

MEDICAL SOCIETY OF LONDON, 11, Chandos Street, Cavendish Square, London, W.—February 13, 8.30 p.m., "*Chronic Hepatitis*," discussion to be introduced by Professor John McMichael and Mr. J. H. Milnes Walker.

NATIONAL HOSPITAL, Queen Square, London, W.C.—February 13, 5 p.m., "*The Present State of Knowledge of the Reactions of the Human Nervous System to Weather and Climate in Northern Cold and Temperate Zones*," by Dr. Helgi Tomasson (Iceland).

Tuesday

CHADWICK PUBLIC LECTURE.—At Royal Society of Tropical Medicine and Hygiene, 26, Portland Place, London, W., February 14, 2.30 p.m., "*Co-ordination Between the Public Health Service and Private Enterprise in Holland: Its Results*," by Dr. C. Banning (Chief Medical Officer of Public Health, the Hague).

CHELSEA CLINICAL SOCIETY.—At South Kensington Hotel, 47, Queens Gate Terrace, London, S.W., February 14, 7 for 7.30 p.m., discussion: "*The Medico-Legal Aspects of Some Recent Cases*," to be opened by Superintendent Cuthbert, C.I.D.

INSTITUTE OF DERMATOLOGY, 5, Lisle Street, Leicester Square, London, W.C.—February 14, 5 p.m., "*Histopathology of the Skin*," by Dr. I. Muende.

INSTITUTE OF UROLOGY.—At St. Paul's Hospital, Endell Street, London, W.C., February 14, (1) 3.30 p.m., Ward Round by Mr. J. E. Semple; (2) 5 p.m., "*Bilharzia and Hydatids*," by Mr. R. Ogier Ward.

ROYAL COLLEGE OF PHYSICIANS OF LONDON, Pall Mall East, S.W.—February 14, 5 p.m., "*Undulant Fever, a Neglected Problem*," Milroy Lecture by Sir Weldon Dalrymple-Champneys.

ROYAL COLLEGE OF SURGEONS OF ENGLAND, Lincoln's Inn Fields, London, W.C.—February 14, 7.30 for 8 p.m., Buckston Browne Annual Dinner of Fellows and Members of the College.

ROYAL PHOTOGRAPHIC SOCIETY: MEDICAL GROUP.—At 16, Princes Gate, London, S.W., February 14, 7 p.m., "*Recent Developments in Medical Photography and Radiography*," by Mr. W. Watson, F.S.R.

UNIVERSITY COLLEGE, Gower Street, London, W.C.—February 14, 5.15 p.m., "*Visual Physiology*," by Dr. L. C. Thomson.

Wednesday

INSTITUTE OF DERMATOLOGY, 5, Lisle Street, Leicester Square, London, W.C.—February 15, 5 p.m., "*X-ray Technique*," by Dr. C. W. McKenny.

INSTITUTE OF PSYCHIATRY, Maudsley Hospital, Denmark Hill, London, S.E.—February 15, 4.30 p.m., lecture-demonstration for postgraduates by Dr. E. Stengel.

LONDON UNIVERSITY.—At St. Mary's Hospital Medical School (Wright-Fleming Institute Theatre), London, W., February 15, 5 p.m., "*The Metabolism of Adrenaline*," by Professor Z. M. Bacq (Liége).

ROYAL SANITARY INSTITUTE.—At 90, Buckingham Palace Road, London, S.W., February 15, 2.30 p.m., London Sessional Meeting. Discussion: "*Developments in the Bacteriological Testing of Milk*," to be opened by J. G. Davis, Ph.D., D.Sc., F.R.I.C.

Thursday

BRITISH INSTITUTE OF RADIOLOGY.—At 32, Welbeck Street, London, W., February 16, 8.15 p.m., "*Some Bone and Joint Changes Associated with Psoriasis*," by Dr. J. B. Fawcitt.

EDINBURGH CLINICAL CLUB.—At B.M.A. Rooms, 7, Drumsheugh Gardens, Edinburgh, February 16, 8 p.m., "*Diagnosis and Treatment of Some Common Allergic Disorders in General Practice*," by Dr. W. Lindsay Lamb.

HUNTERIAN SOCIETY.—At Grosvenor House, Park Lane, London, W., February 16, 7 for 7.30 p.m., annual dinner.

INSTITUTE OF UROLOGY.—At St. Paul's Hospital, Endell Street, London, W.C., February 16, 5 p.m., "*Tumours of Kidney and Ureter*," by Mr. J. D. Fergusson.

MIDDLESEX COUNTY MEDICAL SOCIETY.—At Central Middlesex Hospital, Park Royal, London, N.W., February 16, 2.30 p.m., "*The Integration of Hospital and Domiciliary Services for the Sick*," by Dr. F. Avery Jones; "*Nursing the Sick at Home*," by Miss A. Evans; 4.30 p.m., "*The Mental Defective at Home*," by Dr. B. Beasley; 5 p.m., "*Speech Disorders and Their Treatment*," by Miss E. Richnell. The papers will be followed by a discussion.

ROYAL COLLEGE OF PHYSICIANS OF LONDON, Pall Mall East, S.W.—February 16, 5 p.m., "*Undulant Fever, a Neglected Problem*," Milroy Lecture by Sir Weldon Dalrymple-Champneys.

ROYAL COLLEGE OF SURGEONS OF ENGLAND., Lincoln's Inn Fields, London, W.C.—February 16, 5 p.m., "*A Review of 500 Surgically Treated Cases of Lumbar Intervertebral Disk Protrusion, with Especial Reference to the Late Results of Operation*," Hunterian Lecture by Professor J. E. A. O'Connell.

ROYAL SOCIETY, Burlington House, London, W.—February 16, 2.15 p.m., "*The Mode of Action of Local Hormones*," discussion to be opened by Professor J. H. Burn, F.R.S.

ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE.—At 26, Portland Place, London, W., February 16, 7.30 p.m., "*Chloramphenicol (Chloromycetin) and Tropical Medicine*," Chadwick Lecture by Dr. Joseph E. Smadel (Washington, D.C.). A discussion will follow.

ST. GEORGE'S HOSPITAL MEDICAL SCHOOL, Hyde Park Corner, London, S.W.—February 16, 4.30 p.m., "*Neurology*," lecture-demonstration by Dr. Denis Williams.

WREXHAM AND DISTRICT CLINICAL SOCIETY.—At Wynstay Hotel, Wrexham, February 16, 7.30 p.m., "*Sciatica*," by Professor Lambert Rogers.

Friday

BRITISH INSTITUTE OF RADIOLOGY.—At 32, Welbeck Street, London, W., February 17, 5 p.m., meeting of medical members; 6.30 p.m., "*Impressions of a British Radiologist at Large in the U.S.A.*," by Dr. J. F. Brailsford.

BRITISH STANDING COMMITTEE FOR THE WORLD FEDERATION FOR MENTAL HEALTH.—At Barnes Hall, Royal Society of Medicine, 1, Wimpole Street, London, W., February 17, 5 p.m., International Symposium: "*Mental Health Within the Family and the School*." Speakers: Dr. A. Répond, Professor W. Line, Professor Dr. H. C. Rümke, and Dr. J. R. Rees.

EUGENICS SOCIETY.—At 26, Portland Place, London, W., February 17, 5 p.m., "*The Primrose Path—Some Aspects of the Population Problem*," Galton Lecture by Dr. A. S. Parkes, F.R.S.

LONDON UNIVERSITY.—At St. Mary's Hospital Medical School (Wright-Fleming Institute Theatre), London, W., February 17, 5 p.m., "*The Substances Which Increase the Sensitivity of Tissues to Potassium Ions*," by Professor Z. M. Bacq (Liége).

MAIDA VALE HOSPITAL FOR NERVOUS DISEASES, Maida Vale, London, W.—At Medical School, February 17, 5 p.m., demonstration of Neuro-psychiatric Cases by Dr. M. Greaves.

ROYAL INSTITUTE OF PHILOSOPHY, University Hall, 14, Gordon Square, London, W.C.—February 17, 5.15 p.m., "*Truths of Reflection and Imagination*," by Mr. Karl Britton (University College of Swansea).

ROYAL MEDICAL SOCIETY, 7, Melbourne Place, Edinburgh.—February 17, 8 p.m., "*Manipulative Surgery*," by Professor Walter Mercer

Saturday

YORK MEDICAL SOCIETY.—At 17, Stonegate, York, February 18, 8.30 p.m., "*Post-war Developments in Psychiatric Treatment*," by Dr. C. C. Beresford.

APPOINTMENTS

Dr. Isaac Newton and J. P. Fehily, O.B.E., have been appointed Official Members, and Dr. Chau Sik-nin an Unofficial Member, of the Legislative Council of Hong Kong.

NISBET, G., M.B., Ch.B., D.P.H., County Medical Officer, Soke of Peterborough County Council, to be also School Medical Officer, Peterborough Joint Education Board.

DEWAR, DOUGLAS CAMPBELL, M.D., D.P.M., Whole-time Consultant Psychiatrist, Brookwood Hospital, Knaphill, Woking, Surrey.

GRAHAM, A. R., M.B., Ch.B., D.P.H., Medical Officer of Health, Borough of Mitcham.

PARTINGTON, THOMAS, M.D., M.R.C.P., Consultant Physician to Kettering and Northampton group of hospitals, Oxford Regional Hospital Board.

LEWIS, T. L. T., M.B., F.R.C.S., M.R.C.O.G., Consulting Surgeon to Outpatients, Chelsea Hospital for Women.

BIRTHS, MARRIAGES, AND DEATHS

BIRTHS

Greatrex.—On December 23, 1949, at the Leicester Royal Infirmary, to Wenda Jane, wife of Dr. J. D. Greatrex, a son.

Lowe.—On January 19, 1950, to Dorothy, wife of Dr. G. S. Lowe, of Middlesbrough, a son.

Mories.—On January 28, 1950, at Hillside Nursing Home, Faversham, to Joan (née Cannon), M.B., Ch.B., wife of Dr. Alexander Mories, Albion House, Faversham, Kent, a daughter.

Oakes.—On January 25, 1950, at Calvary Hospital, Hobart, Tasmania, to Jean and Henry Oakes, a daughter.

MARRIAGE

Erooga—Crutchfield.—On January 18, 1950, in London, Mark A. Erooga, M.B., B.S., to Shirley Crutchfield.

DEATHS

Arnison.—On January 27, 1950, at 3, Adeline Gardens, Newcastle-upon-Tyne, William Drewett Arnison, M.D., F.F.A.R.C.S., aged 85.

Brander.—On January 23, 1950, at Eastbourne, Thomas Brander, M.B., C.M., late of Craigmount, Lossiemouth, Morayshire.

Cowper.—On January 28, 1950, in Capetown, South Africa, Claude Marriott Lovell Cowper, M.R.C.S., L.R.C.P., of Barnmead, West Wittering, Sussex, aged 70.

Douglas.—On January 26, 1950, at 60, Ashley Gardens, London, S.W., Archibald Robert John Douglas, M.D., F.R.C.S.

Duke.—On January 23, 1950, at 31, Oliver Grove, London, S.E., Harold Denny Duke, M.R.C.S., L.R.C.P., aged 77.

Green.—On January 27, 1950, at 23, Minto Street, Edinburgh, John Ligertwood Green, M.D.

Joscelyne.—On January 26, 1950, at Stoford, near Yeovil, Frederic Percy Joscelyne, O.B.E., M.C., M.D., D.P.H., aged 76.

Montgomery.—On January 26, 1950, in Kalk Bay, South Africa, Stephen Kinsman Montgomery, M.D., D.R.Ed.

Mounsey.—On January 22, 1950, Ridley Ewart Mounsey, M.R.C.S., L.R.C.P., of Moorlands, Camberley, Surrey.

Smith.—On January 26, 1950, at 64, Richmond Road, Worthing, Henry Sandford Smith, M.R.C.S., late of Eltham, London, S.E.

Stewart.—On January 23, 1950, at 5, Rectory Road, Manchester, 8, Charles Hugh Stewart, M.B., Ch.B., late of 383, Waterloo Road, Manchester, and of Glasgow.

Tuckett.—On January 4, 1950, at his home, Woodhouse Eaves, Loughborough, Leics, Walter Reginald Tuckett, O.B.E., M.R.C.S., L.S.A., J.P., aged 90.

Waddell.—On January 25, 1950, at Ashtead, Surrey, Alexander Ross Waddell, M.B., Ch.B., late of Springburn, Glasgow.

White.—On January 8, 1950, at 16, Sandford Road, Bromley, Kent, Henry White, M.R.C.S., L.R.C.P.

Wiggins.—On January 3, 1950, at Dalkeith, Teville Road, Worthing, Sussex, Henry Wiggins, M.R.C.S., L.R.C.P., aged 84.

Any Questions?

Correspondents should give their names and addresses (not for publication) and include all relevant details in their questions, which should be typed. We publish here a selection of those questions and answers which seem to be of general interest.

Artificial Menopause

Q.—*How can one treat or prevent the symptoms of an artificial menopause, especially irritability, depression, and recurrent hot flushes? The case I have in mind is a woman of 34 who three months ago had a total hysterectomy and bilateral oophorectomy for a Stage I carcinoma of the cervix.*

A.—The first and best line of treatment of menopausal symptoms is a sympathetic explanation of their cause and their temporary nature to the patient, who can be assured that they nearly always become gradually less intense within a few months. Only when the symptoms prove exceptionally severe and persistent is medical treatment indicated. In the case in question oestrogens should not be used, because of their possible stimulating effect on any remaining cervical cells. Alpha-tocopherol (synthetic vitamin E) could be tried as an alternative, but large doses may be necessary: 200 to 2,000 mg. daily for three to twelve weeks or longer (see recent article by H. C. McLaren in the *British Medical Journal*, 1949, **2**, 1378). This treatment is expensive and is not always successful, and older remedies such as calcium, thyroid, or phenobarbitone should be kept in mind. Another possibility is the use of androgens, but again the dose may have to be as much as 30 mg. of methyl testosterone sublingually each day, a dose which may have virilizing effects so that the patient would need to be kept under careful observation. If testosterone is effective then the dose should be gradually reduced over a period of two to three months as in the case of oestrogen therapy. Irradiation of the pituitary gland may be considered as a last resort, but is not much used in this country and is probably not justified except in the most severe and refractory cases.

Xanthoma

Q.—*How many kinds of xanthoma are there? Is anything known about the aetiology, and what is the prognosis? Are any methods of treatment, either local or general, effective?*

A.—Apart from xanthoid degeneration in neoplastic and inflammatory infiltrations, where the change is a local one, xanthomata occur as flat infiltrations on the eyelids (xanthelasma palpebrarum) and as nodular infiltrations elsewhere (xanthoma tuberosum). These two affections are related, and both are seen sometimes in the same patient. Either or both may be familial. Xanthelasma palpebrarum is relatively common and may be associated with no obvious metabolic disturbance. The appearance of the lesions can be improved by painting them with deliquescent trichloracetic acid, but this does not remove the whole depth of the infiltration.

Xanthoma tuberosum is due to deranged lipoid metabolism associated with hypercholesterolaemia or with some altered relationship between cholesterol and its esters in the blood. In consequence of this, cholesterol infiltration into histiocytic tissues occurs—especially at sites of injury or disturbed metabolism, as about the joints, skin appendages, etc. If the blood chemistry appears normal in a particular case it would seem probable that a previous derangement determined the appearance of xanthomata. On the other hand only a proportion of patients with hypercholesterolaemia show these changes. Diabetes and liver disease are important causes of disturbance of lipoid metabolism, and if present their effective treatment will correct the disturbance and lead to disappearance of the xanthomata in the majority of cases. If there is no such cause general treatment is ineffective. Local measures, such as freezing with carbon-dioxide snow, may effect some partial resolution of individual lesions. General or localized xanthoid discoloration of the skin and xanthomatous tumours of other tissues—for example, tendons—may occur. The rare condition of congenital xanthomata in infants is thought by some to be related to hypercholesterolaemia in the mother and by others to indicate xanthoid degeneration of naevo-endotheliomata.

Holidays Abroad

Q.—*In August I am travelling to Rome with eight hundred Scouts, via France and Switzerland. What hazards shall we be exposed to en route, and what precautionary measures should be taken in regard to malaria, typhoid, etc.? The camp in Italy is in an area where in 1945–6 the British Army took full anti-malarial precautions. Will there be any difficulty about obtaining drugs and medical supplies?*

A.—The main immediate hazards *en route* are food-poisoning and dysentery: the more remote hazards are typhoid, paratyphoid, and malaria. Unboiled water should be forbidden in France, Italy, and Switzerland except in the large towns. Fresh fruit should also be forbidden unless it can be peeled: oranges and apples, provided they are peeled, can be eaten. Ice cream should be forbidden, as it may convey typhoid and paratyphoid as well as undulant fever. If the British Army took full antimalarial precautions at the camp in 1946 the same measures should almost certainly be taken in 1950. (1) All tents, messes, and other buildings, particularly latrines, should be sprayed once a week with D.D.T. or gammexane. (2) Intact mosquito-nets should be fitted to each bed. (3) At dusk shorts and open-necked shirts with or without short sleeves should be changed for trousers and shirts with collars and long sleeves. Before sunrise the same precautions should be taken. (4) One tablet (0.1 g.) of proguanil (paludrine) should be taken daily by each person in the camp during the stay in Italy and for 10 days after leaving. Boys should be vaccinated against smallpox, and inoculated with T.A.B. and diphtheria vaccine: preferably they should have been inoculated also with tetanus toxoid. Tetanus is uncommon in large towns, but if abrasions are sustained in country districts the administration of A.T.S. is advisable. There is medical reciprocity between Great Britain and Italy, but not with France or Switzerland; non-poisonous drugs can easily be obtained, however, at any pharmacy in the latter countries. A permit would have to be obtained to export the quantity of drugs required for 800 boys on this kind of tour. The following drugs are suggested: magnesium sulphate, ½ lb. (225 g.); aspirin tablets, 1,000; calomel, ½-gr. (32-mg.) tablets, 500; morphine, ½-gr. (16-mg.) tablets, 100; castor oil, 16 oz. (450 ml.); sulphasuxidine or sulphaguanidine tablets, 1,000. It might also be useful to take iodine, penicillin, sulphadiazine, and a chlorodyne–kaolin mixture. Proguanil tablets, one per person per day in Italy and 500 additional tablets, would also be required. It is important that the medical officer in charge of the boys should inspect the conditions in the camp near Rome before their arrival.

Oedema of the Hand in an Infant

Q.—*A male infant, aged 6 months, has been having periodic attacks of oedema of the left hand. The attacks started about six weeks ago, occur every 4–10 days, last 2–3 days, and are apparently painless. During an attack the oedema and lividity of the whole hand end sharply at the wrist creases. During the attack the child eats and sleeps well, and has no constitutional symptoms. There is no family history of a similar complaint. Is this likely to be a variant of Milroy's disease? Is there any treatment?*

A.—Local causes should be considered first. The child should be watched during sleep and when awake to see if any abnormal posture is responsible for local constriction and congestion of the arm or hand. Clothing which seems sufficiently loose may become too tight in certain positions. Local irritants, fur, plants, chemical or physical agents (particularly cold), may give rise to an urticarial exudation. Sensitivity to sunlight quite commonly causes swelling of the kind described, but not, of course, in winter or on one hand only. Infants at the teething age often show flushing of the face and

a tenseness and reddening of the skin of the hands and fingers. This is often unilateral. Another vasomotor disturbance which is paroxysmal in type, as in the case in question, is angio-neurotic oedema. The face is the usual site, but it may occur in other parts. A definite allergen is rarely discoverable. The antihistamine drugs should be tried, however. Lymph stasis may occur below a neoplasm and is a possibility to be considered. Milroy's disease has been observed in childhood and is occasionally unilateral; the oedema is persistent, but attacks of pain, swelling, and erythema have been described.

Ultra-violet Therapy

Q.—*Has a water-cooled ultra-violet generator with several quartz applicators any special advantages or limitations? For what conditions is it most effective, and are there any contra-indications to its use?*

A.—Water-cooled ultra-violet generators may be used either near the skin, in contact with the skin, or with pressure according to the intensity of the dose which is required. The object of the treatment is to apply effectively the destructive shorter ultra-violet rays. These can be prescribed for their counter-irritant effect, for sterilization and stimulation of granulation tissue, and for a wide variety of dermatological conditions. Thus the main indications are conditions in which counter-irritation is required and indolent ulcers. Previously this type of ultra-violet irradiation was extensively employed in the treatment of superficial tuberculous lesions, particularly lupus vulgaris, in which application with pressure is usual; this field of usefulness has narrowed recently owing to the efficacy of calciferol. Generally speaking, the use of local ultra-violet irradiation is necessarily limited, as in most conditions in which it is indicated alternative treatments are available. There are no special contraindications, and useful descriptions of the technique of application are given in Clayton's *Electrotherapy and Actinotherapy* (Baillière, Tindall and Cox, London), Kovacs's *Light and Electrotherapy* (sixth edition, Lea and Febiger, Philadelphia), and in Krusen's *Physical Medicine* (Saunders, Philadelphia).

Shortening of the Femur

Q.—*A boy aged 11 has a femur shortened by 1½ inches. There is a history of breech presentation and fracture at birth. Does the amount of shortening indicate epiphysial damage and if so is the deformity likely to increase with growth? There is no apparent nerve lesion. Would osteoclasis and extension be feasible to overcome the shortening if this is not increasing, and at what age? There is difficulty with built-up shoes because of weight and inflexibility of the sole. How can this be overcome and what materials are most suitable? Is it practical to have footwear other than walking shoes so treated?*

A.—It would be necessary to see radiographs of the limb before a definite opinion could be formed on whether the shortening is due to epiphysial damage or to other causes. The history of birth fracture, which usually affects the shafts of long bones rather than their ends, suggests that the shortening may have occurred mainly in the shaft. On the other hand the amount of shortening is greater than one would usually expect to result from over-riding of the fragments in an infant. The matter could be determined by clinical and *x*-ray examination. If the shortening is due to epiphysial damage a further increase in the discrepancy would be likely to occur with growth, especially if the lower femoral epiphysis (from which most of the growth of the femur arises) is affected. As to the possibility of a leg lengthening operation, it is the writer's opinion that such operations—which are well recognized, and accepted by many surgeons—are so frequently followed by complications such as skin necrosis, non-union, muscle dysfunction, or joint stiffness that they are seldom justified. On the other hand slowing of growth or shortening of the sound leg allows a discrepancy of 1½ to 2 inches to be corrected without difficulty, and can give very satisfactory results provided the patient is reasonably tall for his age. Slowing of growth in the sound limb is, of course, applicable only to growing children. It is achieved by bridging one or more of the epiphysial cartilage plates—usually at the knee—by means of a bone graft (which causes permanent arrest) or by metal staples (which can be removed later to allow growth to continue). The age at which epiphysial arrest is undertaken depends upon the degree of discrepancy and must be calculated with great care. Operative shortening of the sound limb, after growth is complete, is achieved by excision of a suitable length of bone, usually from the femur.

Built-up footwear need not be unduly heavy. By using a cork insert above a sole of normal thickness quite a light shoe can be made. Such footwear must be specially made to measure, however, and under present conditions this often takes a long time. When the discrepancy between the limbs is slight it is usually more practicable to rely on simple raising of normal shoes with leather. Raised shoes and boots are usually confined to the types used for walking. But there is no reason why football boots, etc., should not be specially made to incorporate a suitable "raise" made from cork or from one of the light plastics.

Blood-pressure Readings in Young Men

Q.—*In the course of routine examinations for fitness for employment in the Tropics I encounter many men of 20 to 25 years of age who have served in the R.A.F. or Fleet Air Arm air crews, and find it the rule rather than the exception to record their blood pressure readings as 150/160 systolic and 70/80 diastolic. Is the expectation of life likely to be affected, or will the blood pressure in such cases gradually revert to a figure nearer the normal?*

A.—It is extremely common, if not the rule, for active young men to show casual blood-pressure readings of the order stated. Basal readings would almost certainly be normal. According to Hines, patients who react to the slight anxiety felt at any medical examination in this way are more likely to develop essential hypertension later in life than those who do not. Follow-up studies tend to confirm predictions of this kind based on the cold pressor test. Where the casual diastolic pressure is between 70 and 80 mm. Hg, however, it is the general experience that the future outlook is normal. It is certainly the rule for young men with an anxiety state, with or without effort intolerance, to have a casual blood pressure of about 160/80; follow-up studies in these cases reveal no higher incidence of hypertension than in control cases.

NOTES AND COMMENTS

Local Analgesia in Obstetrics.—Dr. JEAN L. HALLUM (Birmingham) writes: In the answer to the question on local analgesia in obstetrics ("Any Questions?" January 14, p. 137) mention is made that "some operators insert one finger in the rectum to ensure that the bowel is not punctured." This would seem to be adding a quite unnecessary risk of introducing infection, especially when this form of analgesia is used in domiciliary midwifery, when it is particularly valuable, for example in cases of foetal distress. Provided the site of the initial weal is selected with care one finger in the vagina should prevent any risk of puncturing the bowel. This method of local infiltration was described by the late C. P. Brentnall (*J. Obstet Gynaec. Brit. Emp.*, 1943, **50**, 226). He used this analgesia very successfully to perform the Manchester operation for prolapse.

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